

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
21 December 2000 (21.12.2000)

PCT

(10) International Publication Number  
WO 00/77687 A1

(51) International Patent Classification<sup>7</sup>: G06F 17/30

(21) International Application Number: PCT/US00/15990

(22) International Filing Date: 9 June 2000 (09.06.2000)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
60/138,921 11 June 1999 (11.06.1999) US

(71) Applicant (for all designated States except US): COLLABORATION PROPERTIES, INC. [US/US]; Suite 7, 913 Tahoe Boulevard, Incline Village, NV 89451 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): BURNETT, Gerald [—/US]; 207 Atherton Avenue, Atherton, CA 94027 (US). LAUWERS, Jozef, C. [—/US]; 350 Sharon Park Drive, H-210, Menlo Park, CA 94025 (US). CALABY, Lauren [—/US]; P.O. Box 155, Scotia, CA 95565-0155 (US). HUGHES, James [—/US]; 17830 Woodland Avenue, Morgan Hill, CA 95037 (US). INN, Yul [—/US]; 22281

Bellevue Avenue, Cupertino, CA 95014 (US). VAN-  
DERLIPPE, Richard [—/US]; 1247 Fulton Street, #7,  
San Francisco, CA 94117 (US). HORSCHMAN, Eric  
[—/US]; 312 Cardona Circle, San Ramon, CA 94583  
(US). WALLIN, Brian [—/US]; 814 East Dana Street,  
Mountain View, CA 94041 (US). LUDWIG, Lester  
[—/US]; 1230 Southdown Road, Hillsborough, CA 94010  
(US).

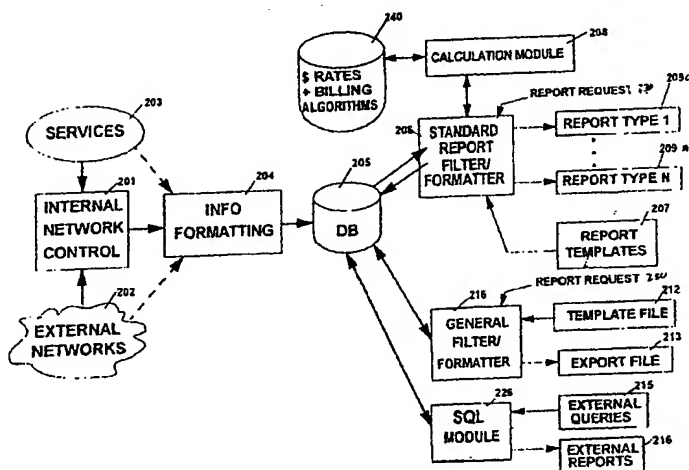
(74) Agent: GOLDMAN, William, W.; Gray Cary Ware &  
Freidenrich LLP, 3340 Hillview Avenue, Palo Alto, CA  
94304 (US).

(81) Designated States (national): AE, AG, AL, AM, AT, AU,  
AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK,  
DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID,  
IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT,  
LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL,  
PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ,  
UA, UG, US, UZ, VN, YU, ZA, ZW.

(84) Designated States (regional): ARIPO patent (GH, GM,  
KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian  
patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European  
patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE,

[Continued on next page]

(54) Title: SYSTEM AND METHOD FOR BROWSER-BASED MULTIMEDIA COLLABORATION REPORTING



(57) Abstract: A multimedia collaboration reporting system and method [figures 1-2] for use in at least one underlying multimedia collaboration system network [figure 4] provided. The system includes an event monitoring module for monitoring any of internal network system events (201), external network system events (202) and service events (203), a database module (205) for recording the monitored events and a reporting module (207) for receiving query parameter information (226) and for generating a report (206) in accordance with the query parameter information. The method includes monitoring any of internal network systems events, external network system events and service events and recording the events to a database (205), querying the database with a set of query parameter information to generate an analysis report and generating the analysis report (209) in accordance with the query parameter information.

WO 00/77687 A1



IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

**Published:**

— *With international search report.*

## SYSTEM AND METHOD FOR BROWSER-BASED MULTIMEDIA COLLABORATION REPORTING

5 The present invention relates to multimedia collaboration systems, and in particular to  
a multimedia collaboration event and status reporting system.

### BACKGROUND OF THE INVENTION

Multimedia collaboration systems facilitate the exchange of audio, video, text, graphics,  
application commands and/or other types of information between users in real, near-real, or  
10 non-real time communication. Interpersonal communication involves a large number of subtle  
and complex visual cues, such as eye contact and body language, which provide additional  
information beyond spoken words and explicit gestures. These cues are, for the most part,  
processed subconsciously by the participants and often control the course of a conversation.  
Multimedia collaboration systems advantageously allow users to detect these cues and thereby  
15 enhance the communication between users.

In addition to spoken words, demonstrative gestures and behavioral cues, collaboration often  
involves the sharing of visual information, such as printed material (i.e., articles), drawings,  
photographs, charts and graphs, as well as videotapes and computer-based animations,  
20 visualizations and other displays, in such a way that participants can collectively and  
interactively examine, discuss, annotate and revise the information. This combination of  
spoken words, gestures, visual cues and interactive data sharing significantly enhances the  
effectiveness of collaboration in a variety of contexts, such as "brainstorming" sessions among  
professionals in a particular field, consultations between one or more experts and one or more  
25 clients, sensitive business or political negotiations, and the like. In a traditional collaboration  
system, such as one in which the participants cannot be in the same place at the same time, the  
beneficial effects of face-to-face collaboration are realized only to the extent that each of the  
remotely located participants can be "recreated" at each site.

30 Conventional desktop videoconferencing systems do not address the challenges of  
collaboration in real-time, primarily because of their lack of high-quality video (for capturing  
the visual cues of the participants) and their limited data sharing capabilities. Similarly,  
telephone answering machines, voice mail, fax machines and conventional electronic mail

systems provide incomplete solutions to the problems presented by asynchronous collaboration because they are incapable of communicating visual cues, gestures, etc., and like conventional video conferencing systems, are generally limited in the richness of the data that can be exchanged.

5

Moreover, the suggestion of extending traditional videoconferencing capabilities from conference centers, where groups of participants are assembled in the same room, to the desktop, where individual participants may remain in their office or home, does not facilitate the interactive sharing of data in the form of text, images, charts, graphs, recorded video, screen displays and the like. Such systems attempt to add computing capabilities to a videoconferencing system, rather than adding multimedia and collaborative capabilities to the user's existing computer system. The same disadvantages apply to augmented video conferencing systems with limited "video mail" capabilities. While useful in limited contexts, these systems do not provide the capabilities for maximally effective collaboration.

15

Conversely, audio and video capture and processing capabilities have been integrated into desktop and portable personal computers and workstations. These capabilities have been used primarily in desktop multimedia authoring systems for producing CD-ROM and DVD-ROM based works. While such systems are capable of processing, combining and recording audio, video and data locally, i.e. at the desktop, they do not adequately support networked collaborative environments, principally due to the substantial bandwidth requirements for real-time transmission of high-quality, digitized audio and full-motion video which preclude conventional local area networks (LANs) from supporting more than a few workstations or personal computers. These systems do not adequately address the problems inherent in a practical implementation of a scalable collaboration system.

25

Examples of high-quality video multimedia collaboration systems are described in U.S. Patent No. 5,617,539 and Patent Cooperation Treaty Application Numbers PCT/US99/01789 and PCT/US98/23596. As the use of these video-oriented multimedia collaboration systems becomes more common, and as multimedia collaboration systems support ever-greater numbers of users, users and/or system administrators will require system usage, diagnostic, performance, and cost monitoring capabilities. Such capabilities may include, for example, the ability to determine the source of system errors, the generation of statistics detailing manners

30

in which particular system resources are utilized and the generation of usage statistics for one or more users relative to a given time period. To date, however, multimedia collaboration systems have provided limited and generally inflexible system monitoring and reporting capabilities. A system is needed that provides an expansive and flexible monitoring and reporting capability to facilitate the management of multimedia collaboration systems. It is to this end that the present invention is directed.

1.

#### SUMMARY OF THE INVENTION

The present invention provides a scalable, evolvable, flexible, and architecturally accommodating system and method for a wide range of potential reporting functions of value in multimedia collaboration systems or other complex networked systems. The system and method herein are particularly advantageous in that they can be applied to a wide variety of systems of arbitrary levels of scale and decentralization and provide a wide range of information on usage, operations, costs, and failures in a wide variety of standard or custom report or query formats servicing the wide ranging needs of usage monitoring, planning, billing and accounting, maintenance, diagnostics, reconfiguration study and design.

In an aspect of the invention, a multimedia collaboration reporting system for use in at least one underlying multimedia collaboration system network is provided. The system includes an event monitoring module for monitoring any of internal network system events, external network system events and service events, a database module for recording the monitored events and a reporting module for receiving query parameter information and for generating a report in accordance with the query parameter information.

The system architecture is such that any of the event monitoring module, the database module and the reporting module may be centralized to the underlying multimedia collaboration system network. Alternatively, any of the event monitoring module, the database module and the reporting module are decentralized from the underlying multimedia collaboration system network. In such case, the decentralization of any of the modules may result in a system architecture that reflects an architecture of the underlying multimedia collaboration system network.

Advantageously, the database may comprise a plurality of localized databases, each configured to store monitored event information from a predetermined multimedia collaboration system network and a centralized database configured to centrally maintain the stored information from each of the plurality of localized databases. Alternatively, the  
5 database may comprise only a centrally located database configured to maintain the monitored event information.

The reporting module is configured to generate either standard or customizable reports about the multimedia collaboration system network in response to database query parameter  
10 information and may include a web-based interface providing for web-based query and response interactivity such that a database query can be formulated and provided via the Internet.

In another aspect of the invention, a multimedia collaboration system for conducting a  
15 conference among a plurality of participants is provided. The system includes a multimedia collaboration system network having a plurality of workstations each having a monitor for displaying visual images and A/V capture and reproduction capabilities for capturing and reproducing video images and spoken audio of the participants, a data network providing a data path along which data can be shared among the plurality of the workstations a data  
20 conference manager for managing the sharing of data between the plurality of workstations. Additionally, the system includes an independent reporting system connected with the multimedia collaboration system network and configured to provide reporting analysis of the multimedia collaboration system network. The independent reporting system includes a network control system configured to monitor any of internal, external or service event  
25 information affecting the multimedia collaboration system network, a database configured to store the monitored event information, a database query system configured to format a database query according to query parameter information and to query the database in accordance with the database query parameter information and a report generation system configured to generate an analysis report from the monitored event information stored in the  
30 database in accordance with the database query parameter information.

In another aspect of the invention, a method for generating reports identifying multimedia collaboration system events includes monitoring any of internal network

system events, external network system events and service events and recording the events to a database, querying the database with a set of query parameter information to generate an analysis report and generating the analysis report in accordance with the query parameter information.

5

In still another aspect of the invention, a reporting system is provided including a network control system configured to monitor any of internal, external or service event information of a multimedia collaboration system network, a database configured to store the monitored event information, a database query system configured to format a database query according to query parameter information and to query the database in accordance with the database query parameter information and a report generation system configured to generate an analysis report from the monitored event information stored in the database in accordance with the database query parameter information.

(B)

## 15 BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a block diagram of an exemplary multimedia collaboration system;

Fig. 2 is an illustration showing an exemplary networked organization of multimedia collaboration systems;

Fig. 3 illustrates some example general high-level call events that can be captured from within multimedia network environments;

Fig. 4 is a block diagram showing an exemplary implementation for a reporting environment in a multimedia network environment, such as that shown in Fig. 1;

Figs. 5A-C are respective block diagrams illustrating exemplary implementations for handling the inherent decentralization of reporting environments in multimedia network environments in accordance with the invention;

Fig. 6 is a block diagram illustrating an example of the operational interactions between various hardware, software, and database component in accordance with an embodiment of the present invention;

Figs. 7A and 7B are respective exemplary database structures showing record and field definitions for use in event logging in accordance with the invention;

Fig. 8 depicts a general connection environment useful for defining various call types and database fields that are associated with records for such call types;

Figs. 9A1-9C2 illustrate alternatives and evolutions of user interface implementation environments that can be utilized by the reporting system in accordance with the present invention;

- Fig. 10 is an example of a user interface for importing database records to the multimedia collaboration system in accordance with the invention;
- 5 Fig. 11 is an example of a user interface for deleting database records from the multimedia collaboration system in accordance with the invention;
- Fig. 12 is an example of a menu of report choices selectable by a user for generating standard reports from the multimedia collaboration system in accordance with the invention;
- 10 Fig. 13A is an example of a set-up interface for determining report generation parameters for generating a calls between users report in accordance with the invention;
- Fig. 13B depicts an exemplary report of calls among all or specified users in accordance with a set of reporting parameters established in the set-up interface of Fig. 13A according to the invention;
- 15 Fig. 14A is an example of a set-up interface for determining report generation parameters for generating a user call detail report in accordance with the invention;
- Fig. 14B depicts an exemplary report of user calls in accordance with a set of reporting parameters established in the set-up interface of Fig. 14A according to the invention;
- Fig. 15A is an example of a set-up interface for determining report generation parameters for generating a number of calls completed by user report in accordance with the invention;
- 20 Fig. 15B depicts an exemplary report of the number of calls completed by a user in accordance with a set of reporting parameters established in the set-up interface of Fig. 15A according to the invention;
- Fig. 16A is an example of a set-up interface for determining report generation parameters for generating a number of calls completed by time period report in accordance with the invention;
- 25 Fig. 16B depicts an exemplary report of the number of calls completed by time period in accordance with a set of reporting parameters established in the set-up interface of Fig. 16A according to the invention;
- Fig. 17A is an example of a set-up interface for determining report generation parameters for generating a call duration report in accordance with the invention;
- 30 Figs. 17B-17D depict respective exemplary reports of call duration in accordance with a set of reporting parameters established in the set-up interface of Fig. 17A according to the invention;



- Fig. 18A is an example of a user call total by time period report in accordance with a set of established reporting parameters according to the invention;
- Fig. 18B is an example of a network availability by number of calls report in accordance with a set of established reporting parameters according to the invention;
- 5 Fig. 18C is an example of a network availability by percentages of calls report in accordance with a set of established reporting parameters according to the invention;
- Fig. 19A is an example of a set-up interface for determining report generation parameters for generating a total device usage by number of calls report in accordance with the invention;
- Fig. 19B is an example of a device usage by number of calls report in accordance with a set of reporting parameters established by the set-up interface of Fig. 19A according to the invention;
- 10 Fig. 20A is an example of a set-up interface for determining report generation parameters for generating a total device usage by duration report in accordance with the invention;
- Fig. 20B depicts an exemplary device usage by duration report in accordance with a set of reporting parameters established by the set-up interface of Fig. 20A according to the invention;
- 15 Fig. 21A is an example of a set-up interface for determining report generation parameters for generating a total device usage by time period report in accordance with the invention;
- Fig. 21B depicts an exemplary total device usage by time period report in accordance with a set of reporting parameters established by the set-up interface of Fig. 21A according to the invention;
- 20 Fig. 22A depicts an exemplary conference center usage by numbers of uses report according to the invention;
- Fig. 22B depicts an exemplary conference center usage by cumulative time used report according to the invention;
- Fig. 22C depicts an exemplary conference center busy by percentage of attempted uses report according to the invention;
- 25 Fig. 22D depicts an exemplary conference call availability report according to the invention;
- Fig. 22E depicts an exemplary trunk busy report according to the invention;
- Fig. 23 is an example of a menu from which a user may select a variety of user-defined custom reports in accordance with the invention;
- 30 Fig. 24 is an example of a custom report interface for saving custom reports in accordance with the invention; and
- Fig. 25 is an example of a custom report save notification interface for indicating the success or failure of a saved report request in accordance with the invention.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The present invention provides a scalable, evolvable, flexible, and architecturally accommodating system and method for a wide range of potential reporting functions of value  
5 in multimedia collaboration systems or other complex networked systems. The system and method herein are particularly advantageous in that they can be applied to a wide variety of systems of arbitrary levels of scale and decentralization and provide a wide range of information on usage, operations, costs, and failures in a wide variety of standard or custom report or query formats servicing the wide ranging needs of usage monitoring, planning, billing  
10 and accounting, maintenance, diagnostics, reconfiguration study and design.

An aspect of the present system and method is to provide a powerful framework for arbitrary degrees of standard and customized report generation and access, including web-based access, for networked systems spanning a wide range of network configurations, architectural  
15 variations, evolving technologies, evolving services, and entities attached to the networks.

Fig. 1 is a block diagram illustrating a conventional video-oriented multimedia collaboration system 99 such as is shown and described in U.S. Patent No. 5,617,539, entitled "Multimedia Collaboration System with Separate Data Network and A/V Network Controlled  
20 by Information Transmitting on the Data Network," and issued to Ludwig et al., on April 1, 1997, which is incorporated herein by reference. While a video-oriented multimedia collaboration system 99 is shown in Fig. 1, it should be noted that the present invention is applicable to any multimedia collaboration system or other networked system and the above Figure is merely exemplary and is not intended to be limiting.

25 As shown in Fig. 1, the multimedia collaboration system 99 includes a number of component entities, including a plurality of user workstations 40, a multimedia local area network (MLAN) 10, a conference bridge or center 36 (a hardware device for audibly and visually connecting multiple parties to a conference), an A/V storage server 100, a LAN 20 coupled to  
30 a gateway 25 and a first wide area network (WAN) 29, and an A/V codec 38 coupled to a second WAN 39. These component entities will be described in more detail herein.

The MLAN 10 comprises an A/V switch 32 and an A/V network manager (AVNM) 34 or similar managing system or other call/connection control entity whose function will be described in detail herein. The user workstations 40 are connected with the system 99 via the A/V switch 32 resident in the MLAN 10. The A/V switch 32 also couples the MLAN 10 to the A/V storage server 100, as well as coupling the second WAN 39 to the MLAN 10 via codec 38 (an integrated circuit for performing data conversion). The first WAN 29 is connected to the LAN 20 via the gateway 25. The LAN 20 is in communication with the AVNM 34 thereby affording network management to the LAN 20. The LAN 20 also functions to couple additional enterprise computers 60 and e-mail/voice-mail application functionality 50 to the system entities connected therewith.

The A/V storage server 100 may be coupled to or otherwise in communication with the network, such as via the switch 32. Such embodiments are described in Patent Cooperation Treaty Application Numbers PCT/US99/01789 and PCT/US98/23596 and are hereby incorporated herein by reference. Briefly, the A/V storage server 100 includes an A/V storage manager 160 for coordinating requests for the storing and playing back of video data and the like, and one or more A/V storage cells 120 configured to store video data and other supplemental information. These cells 120 may be either directly connected to the storage manager 160 (represented as reference numeral 112) or connected with the storage manager 160 via a data LAN 110 that also serves to couple external systems to the network.

In the conventional system shown in Fig. 1, the A/V switch 32 facilitates selective coupling between user workstations 40, the LAN 20, and the codec 38. The A/V switch 32 may also facilitate direct coupling to one or more other multimedia collaboration systems 99. Therefore, workstation users can communicate with each other via multimedia conferencing, such as is described in U.S. Patent No. 5,617,539. Other similar network configurations are also possible and provided for by the invention.

In operation, the AVNM 34 generates event or reporting records in response to a variety of system events. Exemplary types of events for which reporting records are generated, and information included in such reporting records, will be described in detail herein. The following exemplary events that are monitored by the system are largely oriented towards internal and external networks, but in general may also apply to connected service entities.

Such events may include server startup and shutdown events. For example, each startup and shutdown record may include startup time, shutdown time, any applicable error code and any associated error string as well as other additional information.

5           Another event that may be monitored by the system includes user login and logout events. For example, each user login and logout record may include a user ID, a login or logout time as appropriate, and possibly client platform, client type, client operating system version, client collaboration system software version, and other supplemental information. Additionally, aliases are provided for so that a user can associate a different login ID when  
10   desired.

          Call events may also be monitored by the system. For example, each call record may include a caller or calling party ID, a call session ID, a caller terminal port ID, a caller mode description, a caller codec ID, a caller trunk port number, a callee ID, a callee terminal port ID,  
15   a callee mode description, a callee terminal ID, a callee codec ID, a callee trunk port ID, a starting time stamp, and a completion time stamp.

          In addition, call error events may be monitored by the system. For example, each call error record may include information detailing call failures for reasons such as trunk  
20   unavailability, gateway failures, etc., and typically may include a session and/or call ID and timestamp information.

          Another event that may be monitored by the system includes service events. For example, each service record may include details specifying service resources and typically  
25   may include a session ID and timestamp information.

          Service error events may also be monitored by the system. For example, each service error record may include details specifying service resource problems, operational errors and typically may include a session ID and timestamp information.

30           In accordance with the invention, call records affiliated with multi-party calls and multi-point broadcasts may be associated through the utilization of a common session ID. Similarly, service records for sessions and events pertaining to services outside the scope of the network

itself, such as video storage services, may also be associated with corresponding calls and call events through the use of a common session ID. For example, in an embodiment of the invention, a session may be defined as a time interval that begins when system or conference center resources are allocated for a new call that is not associated with a call currently in progress. Accordingly, the session is defined to end when the resources that are allocated in association with the call are freed for others to use. It should be noted that the addition of new callers to an existing two-party call to form a multi-party call falls within the context of an already-existing session.

- 10 In accordance with the invention, the AVNM 34 creates a new session ID each time resources are allocated for a new call that is not associated with a call currently in progress. For example, in an embodiment of the invention, the AVNM 34 transfers or propagates session IDs to other AVNMs 34 and remote clients 40, 45. Thus, when a new party is added to an existing call, the AVNM 34 associated with the calling party transfers the existing session ID to the
- 15 AVNM 34 associated with the callee. The session ID stored within each call record associates multi-step calls and/or calls made on different collaboration systems, such as when a third party is added to a two-party call.

The present invention is equally applicable to a networked environment of multimedia collaboration systems 99, either provided locally or in a wide-area sense. Fig. 2 is an

20 illustration of an exemplary networked organization 199 of multimedia collaboration systems 99, such as that shown in Fig. 1. As the scope of such systems expand and as costs are incurred for equipment and telecommunications services, a number of needs emerge for reporting functions that provide information on the usage, operations, costs, and failures of the associated networked organization of multimedia collaboration systems 199, the individual

25 multimedia collaboration systems 99 and their components. These reporting functions can be utilized for usage monitoring, planning, billing and accounting, maintenance, diagnostics, reconfiguration study and design, as well for other diagnostic and application-specific purposes.

- 30 Because of the resulting wide range of potential reports which could prove beneficial, the present invention provides a framework for arbitrary degrees of standard and customized report generation and access. These reports can be generated by gathering information from throughout the network 199 and from the entities connected to it. As such, the reporting

system framework of the invention can accommodate the wide range of network configurations, architectural variations, evolving technologies, evolving services, and entities attached to the networks 199.

5 Architecturally, the reporting function of the present invention can be treated as a general form of service supported and provided by a server. In accordance with the invention, an implementation of the reporting server 210 may be centralized or decentralized and take on a variety of forms that will be explained in detail herein. For example, a report server 210 working in conjunction with a report database 200 may be provided for managing the reporting  
10 functions of these systems. In accordance with the invention, the report server 210 and the report database 200 may be added to an individual multimedia communications system 99 or also to a networked organization 199 of individual multimedia communications systems 99 so as to provide reporting services to administrative computers or user workstations 40 within one or more multimedia collaboration systems 99. The reporting server 210 may be coupled to one  
15 or more multimedia collaboration systems 99 directly, and/or via an intranet or even the Internet 80, such as is shown in Figs. 1 and 2. Those skilled in the art will understand that a reporting server 210 and a reporting database 200 may be implemented on a single computer system or in any number of decentralized fashions without departing from the invention.

20 Fig. 3 illustrates some examples of high-level call events that can be captured from within multimedia network environments 199, 99 and which may be monitored by the multimedia collaboration system environments 199, 99 so that diagnostic and other informative reports may be generated. To best illustrate these examples of high-level call events, a two-party point-to-point WAN 281 call between two users 262, 272 each on separate  
25 local (or "internal") networks 261, 271 that are connected by the WAN 281 by means of gateways 263, 273 is illustrated in Fig. 3.

As shown in Fig. 3, network control entities, such as AVNMs 260, 270 govern the exchange of exemplary system control messages. Examples of such control messages may  
30 include connection request messages, remote network manager server requests, callee requests, acknowledgement messages, and connection establishment messages. Of course other control messages may be provided and the above are merely exemplary.

It should be noted that no single entity of the users **262**, **272** and network control entities **260**, **270** provide for full accounting of all the message transactions between the entities involved in a communication link. Thus, in accordance with the invention, a report server **210** can be provided (such as shown in Fig. 2) to retrieve the information from the multiple entities. Additional system services may be added to the architecture shown in Fig. 3. For example, such additional services may include network-oriented services, such as multi-point conferencing or event video broadcast, or be provided by attached entities such networked video storage servers, such as that described in Patent Cooperation Treaty Application Numbers PCT/US99/01789 and PCT/US98/23596. In these expanded situations, the number of decentralized entities, control messages, and potential points of failure and billing increase, making reporting more valuable while at the same time making the event logging tasks more complex.

Fig. 4 is a block diagram showing an exemplary implementation for a reporting environment in a multimedia network environment, such as that shown in Fig. 1. In general, such multimedia network environments include not only a "focus" or "internal" network **201** but also one or more external networks **202**. These external networks **202** may include networks similar to the internal network **201** or they may include networks which are completely dissimilar (such as a public WAN). In addition, the multiple networks **201**, **202** are typically used directly or indirectly to provide various services to users. In some cases the services (such as transport) may be provided directly by the network(s), while in other cases the services may be provided in whole or in part by external service-providing entities **203** (such as stand-alone video-on-demand systems).

In accordance with the invention, in a call-reporting environment, each of the networks and service entities **201**, **202**, **203** provides some information either directly (such as event logs) or indirectly (such as WAN call progress signals) which can be accessed as used for reporting purposes. This information can be provided in real-time and/or through later bulk information transfers (such as a monthly WAN report file). The information is then formatted by a system **204** configured to format the data into a format usable within the reporting system. The formatting step(s) may be performed in a centralized or a decentralized fashion. The resultant information formatting may be automatic, manual, or a combination of the two. The formatted information may then be loaded into a database **200**. The database **200** may be

centralized or decentralized, and the information loading may be automatic, manual, or a combination of the two. In accordance with the invention, the information in the database 200 can then be queried, processed and reported in a number of ways.

5           For example, in accordance with the invention, one way the information in the database 200 can then be queried, processed and reported is through use of standard report generation. To implement standard report generation, a standard report filter/formatter 206 may be provided. As utilized herein, a standard report filter/formatter 206 refers to one or more fixed, conditional, or parameterized report templates 207. A report template 207 (and  
10 any conditional or parameterized choices therein) may be selected according to the report or reports desired by a user of the reporting system.

          The selection and subsequent generation of reports may be driven by report request events 220. For example, these requests may be generated by users directly or automatically  
15 as part of a script and/or a calendar-driven automated procedure. Based on the information requested by the report template 207, queries can be made from the standard report filter/formatter 206 to the database 200. In some cases, the data from the database 200 can be placed directly into fields in the template or some equivalent implementation of this action. In other cases, calculations such as sums, averages, ratios, etc., and/or conditional tests (such as  
20 <, >, =, etc.) may be performed. In accordance with the invention, these calculations may be done within the standard report filter/formatter 206 or by an external calculation module 208. The calculations may include billing operations, which involve additional information such as billing rates, billing algorithms, etc., which in turn may be part of the standard report filter/formatter 206, may be provided by the calculation module 208, by a separate repository  
25 entity 240, or explicitly provided as part of the report request event 220. In the case where a separate repository entity 240 may provide the calculations, the separate repository entity 240 may communicate directly with a calculation module 208 and/or directly with the standard report filter/formatter 206.

30           In any case, in accordance with the invention, the standard report filter/formatter 206 may use the queried, calculated, and conditionally-tested information to create one or more reports 209a –209n. It should be noted that a single report request 220 and/or single report template 207 could result in the generation of more than one report 209.



In accordance with the invention, the reports generated in this manner may be presented to a user via a user interface (which will be described in detail herein) and/or printed (i.e., for direct human consumption) or in the form of machine-readable files (that can be subsequently processed or stored in the database 200). Further, in accordance with the invention, to the extent that aspects of the standard reports can be enabled/disabled by any parameters provided by the report requests 220, the standard report filter/formatter 206 can also be used to customize reports to various degrees.

For example, as shown in Fig. 4, flexible general templates 212 (for machine readable report files or human-readable reports) may be submitted to a general filter/formatter 216. These templates 212 are often more parameterized and/or conditionally structured than the standard report templates 207 but need not be so structured. In accordance with the invention, the general templates 212 may consist of strings of a combination of query, conditional, calculation, and formatting instructions. It should be noted that the general filter/formatter 216 could also be provided with additional support entities such as calculation module 208, separate repository entities 240, etc., without departing from the invention. The general filter/formatter 216 could also be further controlled by report request events 220 akin to those utilized by the standard report filter/formatter 206 and described above.

In accordance with the invention, an SQL interface module 226 may be provided for accepting and processing general SQL queries 215 from an external system and for providing reports 216 to an external system. It should be noted that the SQL module 226 could also be provided with additional support entities such as calculation module 208, separate repository entities 240, etc., without departing from the invention.

Those skilled in the art will recognize that aspects of the standard report filter/formatter 206, general filter/formatter 216 and/or SQL module 226 may be integrated as may prove advantageous for an implementation. Therefore, in accordance with the invention, the reporting functionality of the system may be customizable depending on the needs of a user. It should be further understood that additional support entities and functions, such as calculation modules 208 or separate information processing algorithm repositories 240 may be shared across any combination of the standard report filter/formatter 206 function, the general

filter/formatter 216 function, and/or the SQL interface module 226 function as may prove advantageous for an implementation without departing from the invention.

Figs. 5A-C are respective block diagrams illustrating exemplary implementations for  
5 handling the inherent decentralization of reporting environments in multimedia network environments in accordance with the invention. In general, multimedia network environments include a number of decentralized entities acting as event sources (shown in Figs. 5A-C as reference numerals 282a – 282k ). Figs. 5A and 5B illustrate exemplary implementations in which each event source may be served directly or indirectly by individual “local” databases  
10 285a – 285k. These databases may be geographically local, or may be individual for functional reasons. In Fig. 5A, the individual “local” databases 285a – 285k may pass on their updated information by pull or push models, polled or event driven, to a centralized database 295 which in turn may be queried by a query/filter/format module 286 that may be designed to work with the centralized database 295. In Fig. 5B, the individual “local” databases 285a –  
15 285k may be queried directly by a query/filter/format module 286 that may be designed to work with multiple databases 285a – 285k. In Fig. 5C, each event source 282a – 282k may directly provide their updated information to a centralized database 295 which in turn may be queried by a query/filter/format functions 286 that may be designed to work with the centralized database 295 . Those skilled in the art will recognize that a combination of the  
20 above implementations may be utilized to customize the reporting system to reflect functional and architectural advantages without departing from the invention.

The interaction between components of the reporting system of the invention will now be described with reference to Fig. 6. Fig. 6 is a block diagram illustrating an example of the  
25 operational interactions between various hardware, software, and database components in accordance with an embodiment of the present invention in which a web-based interface implementation is utilized. As shown in Fig. 6, in accordance with the invention, the AVNM 34 and/or the A/V Conference Center Manager (ACCM) 35 may be configured to generate and write reporting or event records into a log file 510 that is managed by a database 200. The  
30 database 200 may be implemented using small-scale database products such as Microsoft Access, or in larger-scale applications or where decentralization dictates, other database technologies may be utilized without departing from the invention.

A log file export unit 520 may be configured to retrieve these stored event records from the log file 510 under the direction of one or more objects instantiated from a log class file 530. In turn, the log class file 530 may be configured to write records into the database 200 and may perform some preprocessing and/or initial parsing upon event record data prior to performing a database write operation. The log class file 530 may also control or direct periodic import operations in conjunction with a configuration file (not shown), such that event records stored in the database 200 can be retrieved and the database 200 can be updated on a regular basis.

In accordance with the invention, the web-based interface implementation depicted in Fig. 6 includes a request class file 550 having an HTML page processing unit 560, a report display unit 570, and a custom report unit 580. The request class file 550 provides HTML page templates for performing database management operations, and for generating and saving a wide variety of reports. The page processing unit 560 performs database management and/or database query operations in response to user requests. For example, the page processing unit 560 may retrieve database information in response to a user request including a set of report parameters. As will be described in more detail herein, users accessing the reporting system may specify report parameters via a set-up interface. The page processing unit 560 may filter the results of the database query operation in accordance with one or more such report parameters. The report display unit 570 generates a report in accordance with the user-specified report parameters. The custom report unit 580 facilitates the saving of user-defined reports to the database 200. It should be noted that the present invention accommodates the creation of user groups. User groups are simply aggregates of real users, aliases and other user groups. Thus, when choosing query criteria, a user can select a combination of user groups, users and/or aliases to report against.

The remaining components shown in Fig. 6 include a manager class file 590 that is a parent of the log class file 530 and the request class file 550, and which provides an interface between request class file elements 560, 570, 580 and an intranet and/or the Internet 80 so that a user may access the system. In accordance with the invention, user requests and commands to the system may include data management commands, standard report generation requests, and custom report generation requests.

Figs. 7A and 7B are respective exemplary database structures (referred to generally as reference numerals 300a (Fig. 7A) and 300b (Fig. 7B)) showing record and field definitions for use in event logging in accordance with the invention. Certain fields in the database schema are composed of data types. Those skilled in the art will recognize that other types of record structures may be used without departing from the invention and that the structures shown in Figs. 7A and 7B are merely exemplary.

One such exemplary field type may include a Call ID character field that uniquely identifies a call record and any hop (i.e., tandem trunk connections through additional switches) records that are associated with that call record. Another example of a field type may be a URL field, a character string having a general URL format (i.e., <protocol>://<arguments>) describing a system connection (e.g., video) address. Other field type examples include a Caller field identifying a user at the end point of a call chain from which a call is initiated, a Callee field identifying a user at the end point of a call chain to whom a call is placed and a Caller/Callee Name field. The Caller/Callee Name field identifies a service name associated with each party involved in the call. In some architectures, this aspect could exclude connections placed to specialized entities such as multi-point conference bridges and externally connected servers (such as video storage servers). Calls involving such entities may advantageously use alternate naming conventions in the service name. In some implementations of the system of the invention, the callee name may need to be extracted from the URL, such as in the case of calling H.320 addresses. Another field type example is a Callee vs. Received Call field. This field is utilized for managing multi-party calls. For example, the callee designated in this field may not necessarily be the user that received the call. In some cases the user specified by the caller field is actually the user who received the call. For example, in call forwarding situations where party A calls party B and party A forwards the call to party C, the records for the forwarded call may indicate party C as the caller and party B as the callee.

Fig. 8 depicts a general connection environment useful for defining various call types and database fields that are associated with records for such call types. Fig. 8 illustrates at least six functionally different types of supported calls in a multimedia environment. One such call type involves a direct call between User A 800 and User B 802 on the same switch AVNM1 804 (Call Type 1). Another call type involves a switched call between User A 800 on switch AVNM1 804a and User C 806 on a different switch AVNM2 804b through one or

more trunks 808 (Call Type 2). A third call type involves a call from User A 800 to Outside Caller D 810 using a gateway on the same switch AVNM1 804a (Call Type 3). Another call type involves a call to User A 800 from Outside Caller D 810 using a gateway on the same switch AVNM1 804a (Call Type 4). Yet another call type involves a call from User A 800 to  
5 Outside Caller E 812 using a gateway on a different switch AVNM2 804b (Call Type 5). Finally, a sixth call type involves a call to User A 800 from Outside Caller E 812 using a gateway on a different switch AVNM2 804b (Call Type 6).

It should be noted that call types can be extended to include other types of  
10 connections, such as broadcast and multiple service interconnection (as in conference recording of a multi-party call which in turn includes as one of its "participants" another video service such as video-on-demand or video-mail) as may be supported by the network without departing from the invention.

15 Such call type classification schemes can advantageously be used to differentiate the structure call records in accordance with the invention. For example, the number of fields necessary to characterize a call of Type 1 are far fewer than that needed to characterize a call of Types 5 or 6. Some information may be recorded similarly for all call types. For example, in all cases a global unique ID is created for each call (such as by the originating AVNM).

20

Some exemplary structural variations depending on call type may include a CALL record for maintaining Caller info, Callee info, End-reason information, trunk/gateway information, and next-hop information (if the AVNM is not a destination). If a call involves more than one AVNM, then non-originating AVNMs may log a HOP record to the database  
25 200 that may include a global unique ID, trunk/gateway information and next-hop information (if the AVNM is not a destination).

For multi-point calls, a CONFERENCE record may be logged to the database 200 that may include a Conference Session Unique ID, Conference name information, Start time  
30 information, End time information and an AVNM ID. A PARTICIPANT record may also be logged to the database 200 that may include a Conference Session ID, a Call ID, Slot number information and Reason information.

- The following represent examples of database entry tables that may be utilized by the system for organizing reporting information in accordance with the invention. Some database entry tables may include call tables and the hops involved in placing calls, multi-point conference bridges and the associated conference participants, arbitrary services, arbitrary servers, sessions and logins. Of course different structures, additional tables, and additional or alternate types of information may be gathered in a variety of ways as is understood by one skilled in the art without departing from the invention.

The following table illustrates an example of a call table described above.

Field	Type	Comments	Time Added
Call ID	String	Unique ID for the call, ID is identical for the call and hop record(s) that comprise the call, forty character field.	Record Created
Server Name	String	Ex. <i>Machine.domain.com</i>	Record Created
Call Class	String	LAN, WAN:Dedicated, WAN:Dial	
Caller Name	String	Name of the Caller's service at the time this record is created. For point calls, this field will be updated at the point the actual name arrives.  Exs. <i>Sylvia Brown</i>  <i>Conference Center</i>  <i>Media Server</i>	Call Start

Caller URL	String	String	URL of the caller's address.  Ex. <i>Avnm://machine.domain.com</i>  <i>h320://psn/12025551234;name="Sylvia Brown"</i>	Call Start
Caller Application	String	String	{Conference, AVDM, ACCM, amsm, Viewer, unknown}	Call Start
Caller Login Name	String	String	Windows login name of user.  Ex. <i>sbrown</i>	
Caller Service	String	String	User, Outside User, Media Server, Conference Center, Broadcast, Device	
In Gateway Type	String	String	Only present for incoming outside call  {Tandberg, UTP, RSI }	Call End
In Gateway Class	String	String	Only present for incoming outside call. {LAN, DIAL, DEDICATED}	
In Trunk Name	String	String	Ex. <i>"tan1"</i>	
In Gateway URL	String	String	Only present for incoming outside call  Ex. <i>H320://psn/+12025551234</i>	Call End
Call Mode	Number	Number	{NONE = 0, RECEIVE = 1, SEND = 2, RECEIVE&SEND = 3}	Call End
Receive d Call	Boolean	Boolean	Did the caller receive this call?	Call Start

Callee Name	ng	Stri	As caller Name	Call Start
Callee URL	ng	Stri	As caller URL	Call Start
Callee Service	ng	Stri	User, Outside User, Media Server, Conference Center, Broadcast, Device	
Out Gateway Type	ng	Stri	As incoming Type	Call End
Out Gateway Class	ng	Stri	{LAN, DIAL, DEDICATED}	
Out Trunk Name	ng	Stri	Ex. "tan1"	
Out Gateway URL	ng	Stri	As incoming URL. (may also contain avnm addresses besides h320 addresses)	Call End
Next Hop Server	ng	Stri	Ex. <i>Machine.domain.com</i>	Record Created
Start Time	me	Ti		Record Created
Accept Time	me	Ti	Null if never accepted	Accept
End Time	me	Ti		Call End
Ending Event	ng	Stri	{Hangup, Error, Forwarded, Redirected, Collapsed}	Call End



Call ID	Ancestor ng	Stri ng	Previous ID if call was F orwarded, Redirected or Collapsed.	Call End
Reason	End mber	Nu mber	If Ending Event is an error, contains the error reason. (would also like the error location)	Call End

The following table illustrates an example of an associated hop table described above.

Field	Type	Comments	Time Added
Call ID	String	40 character field that maps to the corresponding Call Record and any corresponding hop records.	Record Created
Server Name	String	Ex. Machine.domain.com	Call End
In Gateway Type	String	Refers to gateway on the side of the previous hop or call record.	Call End
In Gateway Class	String	{LAN, DIAL, DEDICATED}	
In Trunk Name	String	Ex. "tan1"	
In Gateway URL	String		Call End
Callee Name	String	Only present on last hop	Call Start
Callee Video Address	String	Only present on last hop	Call Start

Callee Application	String	Only present on last hop	Call Start
Callee Login Name	String	Only Present on last hop  Windows login name of user.  Ex. <i>sbrown</i>	
Received Call	Boolean	Only present on last hop. Did this user receive this call?	Record Created
Out Gateway Type	String	Refers to gateway on the side of subsequent hop or call record.	Call End
Out Gateway Class	String	{LAN, DIAL, DEDICATED}	
Out Trunk Name	String	Ex. <i>"tan1"</i>	
Out Gateway URL	String		Call End
Next Hop Server	String	Ex. <i>Machine.domain.com</i>	Call Start
End Reason	Number	The ending event is stored in the hop records as some errors are remapped by the time it gets to the call record (losing the original, more specific error)	Call End

The following table illustrates an example of a multi-point conference bridge table described above.

Field	Type	Comments
Session ID	String	A 40 character unique ID to identify this session.
Server Name	Number	Ex. <i>Machine.domain.com</i>
Device Name	String	Ex. <i>Default:4</i>
Start Time	Time	Time when the request was made to find a Conference Center.
End Time	Time	Time when the conference ended.
End Error	Number	PVW error code.
End reason	String	If End Error is 0, this contains the reason for the call ending.  {"Adjourned", "Collapsed", "Only 1 Participant", "No RS User", "All Busy"}

The following table illustrates an example of an associated conference participant table described above.

Field	Type	Comments
Session ID	String	Matches the corresponding value in the Conference Record.

Call ID	String	String	Identifies the Call Record associated with this participant.
Participant Name	String	String	Name of participant
Participant URL	String	String	URL of Conference Center port of participant
Inviter ID	String	String	Call ID of participant that added this user to the conference. In the case of the originator this will be their own call ID.
Slot Number	Number	Number	{-1,0,1,2,3} 0 thru 3 are the users displayed in the quad. -1 is a user viewing the conference on the broadcast port.
IsOriginator	Boolean	Boolean	True for the one participant who started the conference call.
Active Participant	Boolean	Boolean	Does this user have a TCP connection to the ACCM.
Start Time	Time	Time	When a slot was allocated for this participant.
Accept Time	Time	Time	Time when participant accepted call (or if conference center was called, time when it accepted call)
End Time	Time	Time	When the slot for this participant released.
End Error	Number	Number	PVW error code

End reason	ng	Stri If the End error is 0, this contains the reason for the user leaving the Conference.  { "User Hangup", "Conference Hangup", "Conference Adjourn", "User Adjourn" }
---------------	----	--

The following table illustrates an example of an arbitrary services table described above.

Field	Type	Comments
Service Index	Number	Unique ID that is incremented for each new service.
Service Name	String \	Name of the service.  Ex "Sylvia Brown"
Server Name	String	Ex. <i>Machine.domain.com</i>
Session Index	String	ID that matches to the corresponding session.
Service Class	String	{ "Any", "Videophone", "Conference", "VFSD", "Service", "Admin", "VfsTool", "Share", "Remote" "wandaemon", "Receptionist", "ShareServer"  "NetMeeting", "Presentation", "Audience" "Broadcast", "Stream", "Sink" }

Login Name	String	String	The user's Windows login name. This field will be empty for such services as ACCM and AVDM.
Service Port	String	String	Ex. <i>Sonic</i>
Start Time	Time	Time	Time at which service was created.
End Time	Time	Time	Time when the service logged out or disconnected.

The following table illustrates an example of an arbitrary servers table as described above.

Field	Type	Comments
Server Index	Number	Unique ID beginning at 0 for each Server Name and type pair.
Server Name	String	Ex. <i>machine.domain.com</i>
Location	String	Ex. <i>"Redwood Shores 3<sup>rd</sup> floor"</i>
Server Type	String	{ "Avistar Video Network Manager", "Avistar Conference Center Manager", "Avistar Video Device Manager", "Avistar Media Server" }

5

The following table illustrates an example of a session table as described above.

Field	Type	Comments
Session Index	String	A 40 character unique field that uniquely identifies this session.
Server Name	String	Ex. <i>Machine.domain.com</i>
Server Index	Number	Queried for and filled in by ACLM by querying the server table with the server name.
Server Version	String	Ex. <i>AVNM Version 5.6.b.8, protocol 12.3</i>
Server Location	String	Ex. <i>"Redwood Shores"</i>
Login Time	Time	
Last Heard Time	Time	
Logout Time	Time	

The following table illustrates an example of a login table described above.

Field	Type	Comments
Server Name	String	Ex. <i>Machine.domain.com</i>
Login Name	String	The name that the user used to log in to their computer.

Appendix A to this specification lists a series of reporting and billing algorithms that may be utilized by the present invention. Of course, those skilled in the art will understand that other  
5 implementations of the appended algorithms, as well as additional algorithmic functions relating to information processing for reporting may be utilized without departing from the invention.

In reviewing Appendix A, reference to the following description may be beneficial in order to  
10 fully contemplate the scope of the appended algorithms. With regard to calls, Call Records and Hop Records, there is a one-to-one correspondence between calls and Call Records. All data related to a call is defined in one Call Record and zero or more Hop Records. All Call ID values in the Call Record table are unique. All Hop Records associated with a Call Record have the same Call ID as in the Call Record.

15 With regard to call duration, the duration of a (two-party) call is the Call Record End Time minus the Call Record Accept Time. The duration of a conference call is the Conference Record End Time minus the Conference Record Start Time. The duration of a call into a Conference Center is calculated from the Participant record (i.e., the Participant Record End  
20 Time minus the Participant Record Accept Time). It should also be noted that the handling of geographic time zones are provided by the system of the invention. For example, the use of globally implemented "absolute time" (Greenwich Mean Time), or the use of context-specific local time that may be an extension of GMT, may be provided to generate a desired report and to maintain information about the MCS.

25 With regard to call classification, calls generally fall into three classes: LAN, WAN Dial, and WAN Dedicated. A call is classified as a LAN call when the call has no associated hop records and both the In Gateway Type and Out Gateway Type fields are NULL or when its Out Gateway Type field is UTP, its Out Gateway Class is Dedicated, and all its subsequent  
30 hop records have In Gateway Type and Out Gateway Type values that are NULL or UTP. If neither of these conditions are true, then the call is classified as a WAN call. WAN calls are further partitioned into Dedicated and Dial calls based on the contents of the In Gateway Class and Out Gateway Class fields in the Call and Hop records. If the value of either of these fields



in the Call Record or in any Hop Record is DIAL, then the call is classified as a WAN Dial call. Otherwise the call is classified as a WAN Dedicated call.

5 Callers and callees can be designated as actual users or they can be designated as services, meaning that they do not represent an actual user. This designation is determined by the Caller Service and Callee Service fields. Only "User" and "Outside User" are actual users. All other values indicate services. Services can be the originator of a call only if both the caller and callee of the call are services.

10 Regarding originate vs. receive designation, the caller in a Call Record is designated as the Receiver of the call when the caller is an Actual User and the Received Call field is TRUE, the caller and callee are services and the Received Call field is TRUE or when the callee is a service. The callee in a Call Record is designated as the Receiver of the call when the Callee Class is User or Outside User and the Received Call field is FALSE, the caller and callee are  
15 services and the Received Call field is FALSE or when the Caller Name is neither User nor Outside User. The caller in a Call Record is designated as the Originator of the call when the callee is the Receiver. The callee in a Call Record is designated as the Originator of the call when the caller is the Receiver.

20 Call Record and Hop Record completion status can be one of three possible values: not completed due to no allocated resources; not completed due to failure; and available for completion. Several situations result in a Call Record or Hop Record not being completed due to no allocated resources. For example, a Call Record or Hop Record is not completed due to no allocated resources if Local Error Type is "Out" and Local Error is  
25 PVW\_TRUNK\_NO\_REMOTE (-54), PVW\_TRUNK\_NOT\_REACHABLE (-59), PVW\_NO\_TRUNK (-29), PVW\_TRUNK\_IN\_USE (-55), PVW\_TRUNK\_GATEWAY\_RESETTING (-73), PVW\_TRUNK\_DOWN (-53), PVW\_TRUNK\_ISDN\_DOWN (-63), PVW\_DEDICATED\_LINES\_ARE\_DOWN (-109), PVW\_SYNC\_FAILED (-110) or if Local Error Type is "Switch" and Local Error is  
30 PVW\_XBAR\_BUSY (-76). A Call Record or Hop Record is available for completion if Local Error Type is "In" or if Local Error Type is "Out" and Local Error is PVW\_OK (0), PVW\_REFUSED (-8) or PVW\_RING\_TIMEOUT (-47). A Call Record or Hop Record is not completed due to failure in all other cases.

Call Record and Hop Record have busy status classifications of local, remote, or none. Call Record and Hop Record busy status is classified as local if Local Error Type is "Out" and Local Error is PVW\_TRUNK\_NOT\_REACHABLE (-59), PVW\_NO\_TRUNK (-29),  
5 PVW\_TRUNK\_IN\_USE (-55), PVW\_TRUNK\_GATEWAY\_RESETTING (-73),  
PVW\_TRUNK\_DOWN (-53), PVW\_TRUNK\_ISDN\_DOWN (-63),  
PVW\_DEDICATED\_LINES\_ARE\_DOWN (-109) or PVW\_SYNC\_FAILED (-110). Call  
Record and Hop Record busy status is classified as remote if Local Error Type is "Out" and  
Local Error is PVW\_TRUNK\_NO\_REMOTE (-54). In any other case, the busy status is  
10 classified as none.

Returning now to the specification, users of the reporting system, which may include system administrators, information-privileged users, or general users, may generate requests and commands that are directed to the reporting server 210 via a user interface in accordance with  
15 the invention. The reports in turn may be delivered by the same or related user interface. In general, the user interface may be essentially any type of text-based, Graphical User Interface-(GUI) based, networked GUI-based (as with the X Windows system, for example), or web-based interface employing conventional browser-based software such as Netscape Navigator or Microsoft Internet Explorer. For example, in an embodiment of the invention, web-based  
20 communication between a reporting server 210 and a set of user workstations 40 can be implemented or facilitated through the use of a conventional Java Servlet engine, conventional web server and web browser software, conventional database driver software, and data export/transfer software.

25 Conventional GUIs often involve one or more user interface implementation environments. Before the establishment of the browser-based World Wide Web, stand-alone custom interactive graphical displays were utilized by systems whose software operated directly in the native window system environment of the desktop computer. These implementations are still those of choice today for applications where performance, non-web  
30 usage, or architectural factors motivate or dictate this approach. However, the conventional approach has a number of liabilities including dependence on specific details of window systems, operating systems, and other platform aspects as well as administrative complications in versioning, maintenance, upgrading, etc.

In many situations, particularly where any one or more of networked applications, location independence, platform independence, frequent version upgrades, or access to shared databases are involved, GUIs are increasingly implemented as interactive web-based displays  
5 accessed by and operating within the environment of a web-based browser. In these situations, the GUI application software operates within the browser environment and relies on the browser environment to interface in surrogate with the native window system environment of the specific platform.

10 Figs. 9A1-9C2 illustrate alternatives of user interface implementation environments that can be utilized by the present invention. In each of the Figs. 9A1-9C2, a dotted box 601 is used to denote the window system environment of the desktop computer. Figs. 9A1 and 9A2 show respective implementations of application GUIs 602, 603, 604 which operate within the window system environment 601. In Fig. 9A1, the user interface may be provided by a single  
15 comprehensive GUI 602. Fig. 9A2 illustrates an alternative case in which one GUI 603 may serve as a principle user interface and launch secondary feature-specific GUIs 604 as needed.

Figs. 9B1 and 9B2 illustrate hybrid interface implementations which combine windows-based GUIs (reference numbers 622 (Fig. 9B1) and 632 (Fig. 9B2)) and web-based  
20 GUIs (reference numbers 625, 626 (Fig. 9B1) and 635, 636 (Fig. 9B2)). The web-based application GUIs 626, 636 shown in Figs. 9B1 and 9B2 operate in the browser environment 625, 635, respectively. Depending on the implementation, either the windows-based GUI 622 or the browser based GUI 635 may serve as a principle user interface and launch secondary feature specific GUIs as needed.

25 As shown in Fig. 9C1, with the addition of a browser 605 to the window system environment 601, it is possible to include "web-based" application GUIs 606 which operate in the browser environment 605 as described above. The addition of web-based GUIs 606 permits a number of additional implementation options. For example, the implementation depicted in Fig. 9A1 can be modified to utilize web-based GUIs 606 as shown in Fig. 9C1.  
30 Alternatively, when the launch of secondary feature-specific GUIs are involved, such as is shown in Fig. 9C2, window-system GUIs 645, 655 and web-based GUIs 646, 656 can be used in combination with each other.

As mentioned above, the application user interface implementation methods of Figs. 9A1 and 9A2 have been used exclusively in the past, while the implementation methods of Figs. 9C1 and 9C2 are seen as the way of the not-too-distant future. In the interim,  
5 combination methods involving arrangements such as depicted in Figs. 9B1 and 9B2 have value in that they deliver or are perceived to deliver higher degrees of performance and security. The present invention can be implemented using any of the interface methods depicted in Figs. 9A1-9C2, as well as in variations clear to those familiar with the art.

10 Fig. 10 is an example of a browser-based data management interface **1000** for importing records into the database **200** in accordance with the invention. The data management interface **1000** may be configured to execute on a user workstation **40**, and is responsive to user-specified input for controlling conditions (indicated as reference numeral **1001**) determining how the report server **210** (shown in Fig. 2) updates its associated report database  
15 **200**.

Fig. 11 is another example of a browser-based data management interface **1100** for deleting records from the database **200** in accordance with the invention. The data management interface **1100** is responsive to, and permits execution of, user input that specifies conditions  
20 (indicated as reference numeral **1101**) under which all or some reporting records may be deleted from the database **200**. In an embodiment of the invention, only a system administrator or information-privileged user can provide valid input to the data management interfaces **1000** (Fig. 10) and **1100** (Fig. 11), respectively. However, other permission schemes and/or hierarchies may be provided without departing from the invention.

25 Fig. 12 is an exemplary menu **1200** from which a user may select a variety of standard reports in accordance with the invention. For example, reports such as calls between users, user call detail, number of calls completed by a user, call duration, total device usage by the number of calls, total device usage by duration, and total device usage by time period may be generated  
30 by the reporting system. Examples of these reports will be described in detail herein.

Fig. 13A is an example of a set-up interface **1300** for determining report generation parameters for generating a calls between users report **1350** (shown in Fig. 13B). The set-up interface **1300** provides a user with descriptive report information **1301**, and facilitates user selection of

user groups 1302, time ranges 1303, sort order 1304, and report display format 1305. Fig. 13B depicts an exemplary report 1350 of calls among all or specified users. As shown, the report 1350 indicates an account of calls made between users for a given time period using a sort order that consists of sorting at a first level by user and at a second level by time. For each call represented, the report 1350 identifies a call originator, a LAN call recipient and/or recipients or a WAN call recipient or recipients, a starting time, and a duration.

Fig. 14A is an example of a set-up interface 1400 for determining report generation parameters for generating a user call detail report 1450 (shown in Fig. 14B). The set-up interface 1400 provides a user with descriptive report information 1401 and facilitates user input for the selection of a user group 1402, a call type 1403, a time range 1404, a sort order 1405, and a report display format 1406. Fig. 14B depicts an exemplary user call detail report 1450, which indicates details of calls among a group of users for originating and receiving calls spanning a particular time period. For each call, the report 1450 identifies a call originator, a LAN call recipient or recipients or a WAN call recipient or recipients, a starting time, and a duration.

Fig. 15A is an example of a set-up interface 1500 for determining report generation parameters for generating a number of calls completed by user report 1550 (shown in Fig. 15B). The set-up interface 1500 provides a user with descriptive report information 1501, and facilitates user input of a user group 1502, a call type 1503, a time range 1504, a sort order 1505, and a report display format 1506. Fig. 15B depicts an exemplary number of calls completed by user report 1550, which graphically indicates a number of LAN calls and/or WAN calls originated and/or received by a specified user or users and/or group or groups of users within a specified time interval.

Fig. 16A is an example of a set-up interface 1600 for determining report generation parameters for generating a number of calls completed by time period report 1650 (shown in Fig. 16B). The set-up interface 1600 provides a user with descriptive report information 1601 and facilitates user selection of a user group 1602, a call type 1603, a time range 1604, a time period 1605, a sort order 1606 and a report display format 1607. Fig. 16B depicts an example of a number of calls completed by time period report 1650, which indicates a number of calls using an indicated type of network connection that were originated and/or received by a specified group of users during a specified time period.

- Fig. 17A is an example of a set-up interface 1700 for determining report generation parameters for generating a call duration report 1750 (shown in Fig. 17B). The set-up interface 1700 provides descriptive report information 1701 and facilitates user input of a user group 1702, a call type 1703, a time range 1704, a sort order 1705 and a report display format 1706. Figs. 17B-17D depict respective examples of call duration reports 1750, which depict cumulative call durations for LAN calls and/or WAN calls associated with one or more specified groups of users and a specified time interval.
- 10 Examples of three additional reports that may be generated according to specified parameters as described above are shown in Figs. 18A-18C. Fig. 18A is an example of a user call total by time period report 1800 that includes a bar chart representing the cumulative minutes of use for LAN calls, WAN calls made using a dial-up connection and/or WAN calls made using a dedicated connection during a specified time range broken down by month.
- 15 Fig. 18B is an example of a network availability by number of calls report 1825 that includes a bar chart representing the results of calls using the specified networks during a specified time period. As shown in Fig. 18B, possible report indicators include available for completion, not completed due to unavailable resources, and/or not completed due to network or other system error.
- 20 Fig. 18C is an example of a network availability by percentages of calls report 1850 that includes a bar chart representing the percentages, rather than numbers, of calls available for completion, not completed due to unavailable resources, and/or not completed due to error during a specified time period.
- 25 Fig. 19A is an example of a set-up interface 1900 for determining report generation parameters for generating a total device usage by number of calls report 1950 (shown in Fig. 19B). The set-up interface 1900 provides descriptive report information 1901 and facilitates user specification of a device or devices 1902, a time range 1903, a sort order 1904 and a report display format 1905. Fig. 19B is an exemplary device usage by number of calls report 1950 that indicates a total number of inbound and/or outbound calls for a set of specified devices during a specified time interval.
- 30

Fig. 20A is an example of a set-up interface **2000** for determining report generation parameters for generating a total device usage by duration report **2050** (shown in Fig. 20B). The interface **2000** provides descriptive report information **2001**, and facilitates user specification of a set of devices **2002**, a time period **2003**, a sort order **2004** and a report display format **2005**. Fig. 20B depicts an exemplary device usage by duration report **2050**, which indicates a cumulative inbound and outbound use time for a specified set of devices during a specified time period.

Figure 21A is an example of a set-up interface **2100** for determining report generation parameters for generating a total device usage by time period report **2150** (shown in Fig. 21B). The set-up interface **2100** provides descriptive report information **2101**, and facilitates user input to specify a device set **2102**, a time range **2103**, a time period **2104**, a sort order **2105** and a report display format **2106**. Fig. 21B depicts an exemplary total device usage by time period report **2150**, indicating a cumulative inbound and outbound usage time for a specified set of devices during a specified time period.

Examples of four additional reports that may be generated according to specified parameters as described above are shown in Figs. 22A-22D. Fig. 22A depicts an exemplary conference center usage by numbers of uses report **2200** that includes a bar chart representing the number of uses of conference centers in the specified MCSs. Fig. 22B depicts an exemplary conference center usage by cumulative time used report **2225** that includes a bar chart representing the cumulative time of use of conference centers in the specified MCSs during the specified time interval. Fig. 22C depicts an exemplary conference center busy by percentage of attempted uses report **2250** that includes a bar chart representing the percentage of times that a conference center was busy on the specified MCS when it was called during the specified time period. It should be noted that similar reports (with corresponding set-up interfaces) can readily be provided for other network devices. For instance, reports of usage by number of uses and usage by cumulative time used can be provided for switches **32** and AVSSs **100**, and reports of being in use can be provided for AVSSs **100**.

Fig. 22D depicts an exemplary conference call availability report **2275** that includes a bar chart representing, for specified networks during a specified time period, the number of conference calls available for completion, the number of conference calls not completed due to

unavailable resources and the number of calls not completed due to network error. Unlike the reports shown in Figs. 22A-22C which concern a network device conference center 36, the report 2275 shown in Fig. 22D concerns a service conference call report. Accordingly, the representations in the bar chart of calls not completed due to insufficient resources represent

5 not only cases in which conference centers 36 are unavailable, but also cases in which other network resources are unavailable, such as AVSSs 100, if those resources are utilized for the call. Similarly, the representations in Fig. 22D of calls not completed due to system error represent not only cases in which there are errors in conference centers 36, but also cases in which there are errors in other network resources. Likewise; the representations of calls

10 available for completion represent cases in which not only conference centers 36 are available and working, but all other necessary network resources are as well. It should be noted that reports like that depicted in Fig. 22D depicting conference call availability can be provided for other multimedia or collaborative services as well. For example, reports may be provided for two-party videoconferences, video-on-demand, video recording, and videoconference

15 recording, such as are disclosed in U.S. Patents No. 5,617,539 and in Patent Cooperation Treaty Application Numbers PCT/US99/01789 and PCT/US98/23596.

Fig. 22E depicts an exemplary trunk busy report 2290 that includes a detailed listing for networks over a specified time period, a summary of the number of busy trunks during the

20 specified time period. Although conference centers and trunks are specifically illustrated in the above reports, those skilled in the art will recognize that any service or shared hardware resources could be designated by the reporting features of the present invention and the above illustrations are merely exemplary.

25 Fig. 23 is an example of a menu 2300 from which a user may select a variety of user-defined custom reports in accordance with the invention. Custom reports may be derived from standard reports, such as those shown in Figs. 13A-22D, and may be defined and saved in the database 200 in accordance with specified settings or parameters. Alternatively, a user may select from a list of variables and/or parameter choices and define particular conditions to

30 create a unique custom report.

Fig. 24 is an example of a custom report interface 2400 for saving custom reports to the database 200 in accordance with the invention. Fig. 25 is an example of a custom report save



notification interface **2500** in accordance with the invention for indicating the success or failure of a saved report to the database **200**.

5 While the reports described herein were illustrated according to specific embodiments, those skilled in the art will recognize that the information contained in the reports can be presented according to any presentation implementation. Moreover, the reports can be printed or otherwise output using a vast number of different kinds of media without departing from the invention. Additionally, machine readable report files can be provided in commonly read file formats, such as "comma separated values" or any other similar file format scheme.

10

While the foregoing has been described with reference to particular embodiments of the invention, such as the implementation of a multimedia collaboration reporting system, the invention is not limited to such embodiments described herein. It will be appreciated by those skilled in the art that changes in these embodiments may be made without departing from the principles and spirit of the invention. For example, in an alternative web-based embodiment of 15 the invention, the database **200** may store a plurality of system events and database query and calculation commands may actually be embedded in the web page code such that the database queries may be carried out without use of network accessed report query filter format servers **206**, **216** and the like. Additionally, the utilization of a database **200** may be also eliminated 20 by in some embodiments of the invention.

## WHAT IS CLAIMED IS:

1. A multimedia collaboration reporting system for use in at least one underlying multimedia collaboration system network, comprising:
  - an event monitoring module for monitoring
  - 5 any one or more of internal network system events, external network system events and service events;
  - a database module for recording the monitored events therein and for classifying the monitored events according to predetermined characteristics and attributes; and
  - a reporting module for receiving query parameter information from a user and for
  - 10 generating a report in accordance with the query parameter information.
2. The multimedia collaboration reporting system of Claim 1, wherein there are a plurality of multimedia collaboration system networks and wherein one of the modules is centralized to a particular one of the plurality of multimedia collaboration system networks.
- 15 3. The multimedia collaboration reporting system of Claim 1, wherein there are a plurality of multimedia collaboration system networks and wherein any of the modules are decentralized by being distributed among the plurality of multimedia collaboration system networks.
- 20 4. The multimedia collaboration reporting system of Claim 3, wherein the decentralization of any of the modules results in a first system architecture that mirrors a network architecture which is common to a selected one of the multimedia collaboration system networks.
- 25 5. The multimedia collaboration reporting system of Claim 1, wherein the events include one or more of server startup events, server shutdown events, user login events, user logout events, call events, call error events, service events and service error events.
6. The multimedia collaboration reporting system of Claim 5, wherein the server startup events are maintained in a startup record stored in the database.
- 30 7. The multimedia collaboration reporting system of Claim 6, wherein the startup record includes any of startup time information, error code information, error string information and supplemental information.

8. The multimedia collaboration reporting system of Claim 5, wherein the server shutdown events are maintained in a shutdown record stored in the database.
- 5     9. The multimedia collaboration reporting system of Claim 8, wherein the shutdown record includes any of shutdown time information, error code information, error string information and supplemental information.
- 10     10. The multimedia collaboration reporting system of Claim 5, wherein the user login events are maintained in a user login record stored in the database.
- 15     11. The multimedia collaboration reporting system of Claim 10, wherein the user login record includes any of user ID information, login time information, client information and supplemental information.
12. The multimedia collaboration reporting system of Claim 5, wherein the user logout events are maintained in a user logout record stored in the database.
- 20     13. The multimedia collaboration reporting system of Claim 12, wherein the user logout record includes any of user ID information, logout time information, client information and supplemental information.
- 25     14. The multimedia collaboration reporting system of Claim 5, wherein the call events are maintained in a call record stored in the database.
15. The multimedia collaboration reporting system of Claim 14, wherein the call record includes any of caller information, call session information, callee information and timing information.
- 30     16. The multimedia collaboration reporting system of Claim 5, wherein the call error events are maintained in a call error record stored in the database.

17. The multimedia collaboration reporting system of Claim 16, wherein the call error record includes any of call failure information, session information, call information and timing information.

5 18. The multimedia collaboration reporting system of Claim 5, wherein the service events are maintained in a service record stored in the database.

19. The multimedia collaboration reporting system of Claim 18, wherein the service record includes any of service resource information, session information and timing information.

10

20. The multimedia collaboration reporting system of Claim 5, wherein the service error events are maintained in a service error record stored in the database.

15 21. The multimedia collaboration reporting system of Claim 20, wherein the service error record includes any of service resource problem information, operational error information, session information and timing information.

22. The multimedia collaboration reporting system of Claim 1, wherein the database comprises a plurality of localized databases, each database configured to store the monitored event information from a particular multimedia collaboration system network and a centralized database configured to centrally maintain the stored information from each of the plurality of localized databases.

20

23. The multimedia collaboration reporting system of Claim 1, wherein the database comprises a centrally located database configured to maintain the monitored event information.

25

24. The multimedia collaboration reporting system of Claim 1, wherein the database comprises a plurality of localized databases, each database configured to store the monitored event information from a particular multimedia collaboration system network.

30

25. The multimedia collaboration reporting system of Claim 1, wherein the reporting module is configured to generate either standard or customizable reports relating to the operation of the

multimedia collaboration system network in response to the database query parameter information.

26. The multimedia collaboration reporting system of Claim 1, wherein the reporting module  
5 includes a web-based interface for providing either of a web-based query or response interactivity to the reporting such that a database query can be formulated and provided via the Internet.

27. The multimedia collaboration reporting system of Claim 1, wherein in response to the  
10 query parameter information, the reporting module performs either of predetermined calculations or conditional tests on the event information stored in the database in order to generate a report.

28. The multimedia collaboration reporting system of Claim 1, wherein the report is  
15 formulated as a machine readable report file.

29. The multimedia collaboration reporting system of Claim 28, wherein the report is formulated as a comma separated value report file.

20 30. The multimedia collaboration reporting system of Claim 1, wherein the report is formulated as a combination of textual and graphical data.

31. A multimedia collaboration system for conducting a conference among a plurality of participants comprising:  
25 a multimedia collaboration system network, including  
a plurality of workstations each having a monitor for displaying visual images and A/V capture and reproduction capabilities for capturing and reproducing video images and spoken audio of the participants;  
a data network providing a data path along which data can be shared among the plurality of the  
30 workstations; and  
a data conference manager for managing the sharing of data between the plurality of workstations; and

- an independent reporting system connected with the multimedia collaboration system network and configured to provide reporting analysis of the multimedia collaboration system network, the independent reporting system including
- 5 a network control system configured to monitor one or more of internal, external or service event information affecting the multimedia collaboration system network;
- a database configured to store the monitored event information;
- a database query system configured to format a database query according to query parameter information and to query the database in accordance with the database query parameter information; and
- 10 a report generation system configured to generate an analysis report from the monitored event information stored in the database in accordance with the database query parameter information.
32. The multimedia collaboration system of Claim 31, wherein the database comprises a
- 15 plurality of localized databases, each database configured to store the monitored event information from a particular multimedia collaboration system network and a centralized database configured to centrally maintain the stored information from each of the plurality of localized databases.
- 20 33. The multimedia collaboration system of Claim 31, wherein the database comprises a centrally located database configured to maintain the monitored event information.
34. The multimedia collaboration system of Claim 31, wherein the database comprises a plurality of localized databases, each database configured to store the monitored event
- 25 information from a particular multimedia collaboration system network.
35. The multimedia collaboration system of Claim 31, wherein the database query system includes any of a standard filter formatter, a general filter formatter and an SQL interface formatter.
- 30 36. The multimedia collaboration system of Claim 31, wherein the report generation system is configured to generate either standard or customizable reports about the multimedia collaboration system network in response to the database query parameter information.

37. The multimedia collaboration system of Claim 31, wherein the reporting module includes a web-based interface for providing either of a web-based query or response interactivity such that a database query can be formulated and provided via the Internet.
- 5
38. The multimedia collaboration system of Claim 31, wherein in response to the query parameter information, the reporting module performs either of predetermined calculations or conditional tests on the event information stored in the database in order to generate a report.
- 10
39. The multimedia collaboration system of Claim 31, wherein the report is formulated as a machine readable report file.
40. The multimedia collaboration system of Claim 39, wherein the report is formulated as a comma separated value report file.
- 15
41. The multimedia collaboration system of Claim 31, wherein the report is formulated as a combination of textual and graphical data.
42. A multimedia collaboration system for conducting a conference among a plurality of
- 20 participants comprising:  
a multimedia collaboration system network, including  
a plurality of workstations each having a monitor for displaying visual images and A/V capture and reproduction capabilities for capturing and reproducing video images and spoken audio of the participants;
- 25 a data network providing a data path along which data can be shared among the plurality of the workstations; and  
a data conference manager for managing the sharing of data between the plurality of workstations; and  
an independent reporting system connected with the multimedia collaboration system network
- 30 and configured to provide reporting analysis of the multimedia collaboration system network, the independent reporting system including  
a network control system configured to monitor one or more of internal, external or service event information affecting the multimedia collaboration system network;

- a database configured to store the monitored event information;  
a web-based database query system configured to format a database query according to query parameter information and to query the database in accordance with the database query parameter information; and  
5 a report generation system configured to generate an analysis report from the monitored event information stored in the database in accordance with the database query parameter information.
43. A method for generating reports identifying multimedia collaboration system events,  
10 comprising the steps of:  
monitoring one or more of internal network system events, external network system events and service events and recording the monitored events to a database, the stored events being classified in the database according to a predetermined set of characteristics and attributes;  
15 querying the database with a set of query parameter information to generate an analysis report; and  
generating the analysis report in accordance with the query parameter information.
44. A reporting system, comprising:  
a network control system configured to monitor one or more of internal, external or  
20 service event information of a multimedia collaboration system network;  
a database configured to store the monitored event information;  
a database query system configured to format a database query according to query parameter information and to query the database in accordance with the database query parameter information; and  
25 a report generation system configured to generate an analysis report from the monitored event information stored in the database in accordance with the database query parameter information.
45. The reporting system of Claim 44, wherein the database query system includes any of a  
30 standard filter formatter, a general filter formatter and an SQL interface formatter.



46. The reporting system of Claim 44, wherein the report generation system is configured to generate either standard or customizable reports relating to the operation of the multimedia collaboration system network in response to database query parameter information.

5     47. The reporting system of Claim 44, wherein the reporting module includes a web-based interface for providing either of a web-based query or response interactivity such that a database query can be formulated and provided via the Internet.

48. The reporting system of Claim 44, wherein in response to the query parameter  
10     information, the reporting module performs either of predetermined calculations or conditional tests on the event information stored in the database in order to generate a report.

49. The reporting system of Claim 44, wherein the report is formulated as a machine readable report file.

15

50. The reporting system of Claim 49, wherein the report is formulated as a comma separated value report file.

51. The reporting system of Claim 44, wherein the report is formulated as a combination of textual and graphical data.

20

52. A reporting system, comprising:

        a network control system configured to monitor one or more of internal, external or service event information of a multimedia collaboration system network;

        a database configured to store the monitored event information;

25     a web-based database query system configured to format a database query according to query parameter information and to query the database in accordance with the database query parameter information; and

        a report generation system configured to generate an analysis report from the monitored event information stored in the database in accordance with the database query

30     parameter information.

## APPENDIX A

The following appendix lists some example high-level descriptions of various reporting algorithms that may be implemented by the present invention. Reference should be made to the specification to determine the scope of each of the following algorithms. The algorithms included in this appendix are User Call Total (A.1), User Call Summary (A.2), User Call Detail (A.3), User Call Total by Time Period (A.4), Network Availability (A.5), System Usage Between Switches (A.6), Trunk Busy (A.7), Conference Center Usage (A.8), and Conference Center Busy (A.9). Of course, those skilled in the art will recognize that other implementations of these algorithms, as well as additional algorithmic functions relating to information processing can be utilized without departing from the invention and the foregoing is provided merely as exemplary algorithms. A.1 - User Call Total

## 15 Switch

Originate:

Find all records with Accept Time and End Time in selected time range in which Caller Name matches selected name and caller is originator, or Callee Name matches selected name and callee is originator.

## 20 Receive:

Find all records with Accept Time and End Time in selected time range in which Caller Name matches selected name and caller is receiver, or Callee Name matches selected name and callee is receiver.

Originate and Receive:

## 25 Find all records with Accept Time and End Time in selected time range in which Caller Name or Callee Name matches selected name

For each Call Record

List by user and call class, rounding class and user totals to nearest minute.

30 A.2 - User Call Summary

For each user in the first group of selected users

Switch

Originate:

Find all records with Accept Time and End Time in selected time range in which  
Caller Name matches selected name, caller is originator, and Callee Name is in the second  
group of selected users, or  
Callee Name matches selected name, callee is originator, and Caller Name is in the second  
5 group of selected users.

Receive:

Find all records with Accept Time and End Time in selected time range in which  
Caller Name matches selected name, caller is receiver, and Callee Name is in the second group  
of selected users, or  
10 Callee Name matches selected name, callee is receiver, and Caller Name is in the second group  
of selected users.

Originate and Receive:

Find all records with Accept Time and End Time in selected time range in which  
Caller Name matches selected name and Callee Name is in the second group of selected users,  
15 or  
Callee Name matches selected name and Caller Name is in the second group of selected users.

Create Service\_List containing fields for Service (Media Server, Conference Center,  
Presentation, Broadcast, Device) and for each call class, Total and Minutes

For each Call Record

20 If callee is an Actual User and caller is an Actual User, then  
List by user and call class, rounding class and user totals to nearest minute.  
Else

Update Service\_List by Call Service and call class Total and Minutes

For each entry in Service\_List

25 List by call service and call class, rounding class and user totals to nearest minute.

### **A.3 - User Call Detail**

For each selected user

Switch

30 Originate:

Find all records with Accept Time and End Time in selected time range in which  
Caller Name matches selected name and caller is originator, or  
Callee Name matches selected name and callee is originator.

- Receive:
- Find all records with Accept Time and End Time in selected time range in which  
Caller Name matches selected name and caller is receiver, or  
Callee Name matches selected name and callee is receiver.
- 5 Originate and Receive:
- Find all records with Accept Time and End Time in selected time range in which Caller Name  
matches selected name or Callee Name matches selected name.
- For each Call Record found
- If Caller Service or Callee Service is Conference Center then
- 10 Find Participant record with same Call ID
- Find all Participant Records with same Conf Session ID as this Participant Records
- Create new ordered list Action\_List of Action Records (like Participant Record with two new  
field called Action Time and Action Type)
- Insert each Participant Record into Action\_List twice using the following process
- 15 For each Participant Record
- If Slot Number is -1, then ignore
- Insert in ascending order by comparing Accept Time to Action Time, set Action Time to  
Accept Time and Action Type to Join
- For each Participant Record
- 20 If Slot Number is -1, then ignore
- Insert in ascending order by comparing End Time to Action Time, set Action Time to End  
Time and Action Type to Leave
- Set Active\_Participant\_List initially NULL
- Set Previous\_Action\_Time to NULL
- 25 Loop through Action\_List
- If selected name is in Active\_Participant\_List, then
- List call with originator column containing selected name, participants column containing  
Active\_Participant\_List, Start Time column containing Previous\_Action\_Time, Duration  
column containing difference between Action Time and Previous\_Action\_Time
- 30 If Action Type is Join, then
- Add Participant Name to Active\_Participant\_List
- Else if Action Type is Leave, then
- If Call Record CallID is Participant CallID, then

List call with originator column containing selected name, participants column containing Active\_Participant\_List, Start Time column containing Action Time, Duration column containing difference between Action Time and Previous\_Action\_Time

Remove Participant Name from Active\_Participant\_List

- 5 Exit Loop through Action List
- Set Previous\_Action\_Time to Action Time
- Else
- If call is to a service
- List call by originator and service name
- 10 Else
- List call by originator and recipient

#### **A.4 - User Call Total by Time Period**

For each selected user

- 15 Switch
- Originate:
- Find all records with Accept Time and End Time in selected time range in which Caller Name matches selected name and caller is originator, or Callee Name matches selected name and callee is originator.
- 20 Receive:
- Find all records with Accept Time and End Time in selected time range in which Caller Name matches selected name and caller is receiver, or Callee Name matches selected name and callee is receiver.
- Originate and Receive:
- 25 Find all records with Accept Time and End Time in selected time range in which Caller Name matches selected name or Callee Name matches selected name.
- List by selected time period and call class, rounding class and time period totals to nearest minute.

#### **A.5 - Network Availability**

For each selected switch

Find all Call Records and Hop Records with Server Name equal to the switch and Accept Time and End Time in selected time range

For all Call Records

Determine completion status

- 5 Increment call count by completion status
- List by call completion status

#### **A.6 - System Usage Between Switches**

For each selected switch

- 10 Find all Call Records with Server Name equal to selected switch and Accept Time and End Time in selected time range

Create list of destination switches Destination\_List containing fields for Server Name, Server Location, and for each LAN, WAN:Dedicated, WAN:Dial calls, Total, fields for number of calls and minutes

- 15 For each Call Record
  - If call is not LAN call, then
  - Determine call class and update destination switch (Server Name of last Hop Record) entry on Destination\_List
  - For each entry in Destination\_List
- 20 List information by call class, rounding times to nearest minute

#### **A.7 - Trunk Busy**

For each selected switch

Find all Call Records and Hop Records with Server Name or Next Hop Server equal to selected switch and Accept Time and End Time in selected time range

- 25 Create list of destination switches Destination\_List containing fields for Server Name, Server Location, and Busy Count for each of 24 hours, initially all 0

For each Call Record and Hop Record

Determine Call Record or Hop Record busy status

- 30 If Server Name is selected switch and busy status is local, then increment Busy Count for hour of Start Time for the Server Name of call

If Next Hop Server is selected switch and busy status is remote, then increment Busy Count for hour of Start Time for the Next Hop Server of call

For each entry in Destination\_List

List information by Server Name, Server Location, Busy Count per hour

5

#### **A.8 - Conference Center Usage**

For each selected switch

Find all Conference Records with Server Name equal to selected switch and Accept Time and End Time in selected time range

- 10 Create list of conference usage Conference\_List containing fields for Server Name, Server Location, and Total Count and Total Minutes

For each Conference Record

Update entry on Destination\_List

For each entry in Destination\_List

- 15 List information by Server Name, Server Location, Total Count, Total Minutes (rounded to nearest minute)

#### **A.9 - Conference Center Busy**

For each selected switch

- 20 Find all Conference Records with Server Name equal to selected switch and Accept Time and End Time in selected time range

Create list of conference usage Conference\_List containing fields for Server Name, Server Location, and Busy Count for each of 24 hours, initially all 0

For each Conference Record

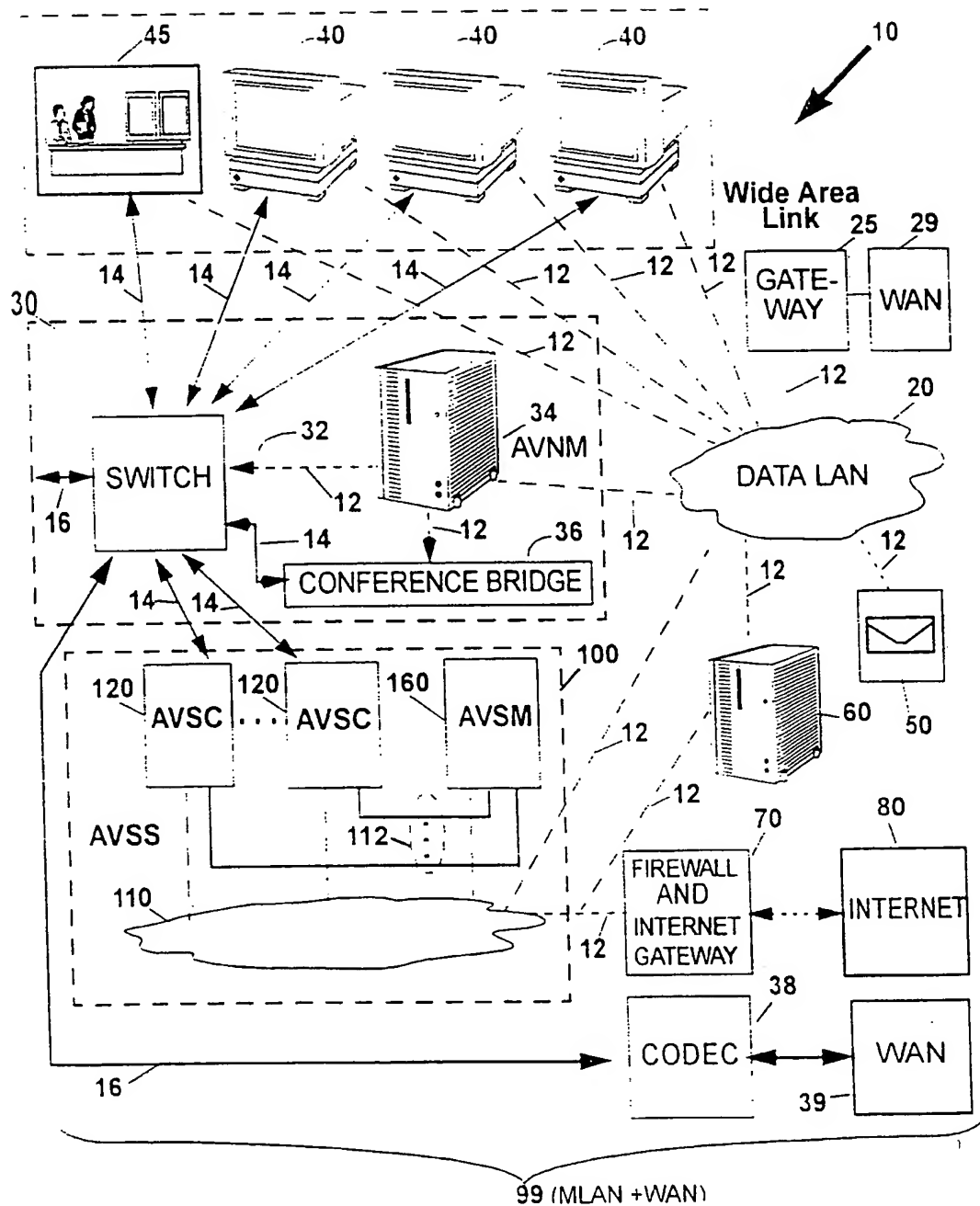
- 25 If Conference End Event is "All busy", then increment count for hour of Start Time for the Server Name of call

For each entry in Destination\_List

List information by Server Name, Server Location, Busy Count per hour

1/49

Figure 1



PRIOR ART



2/49

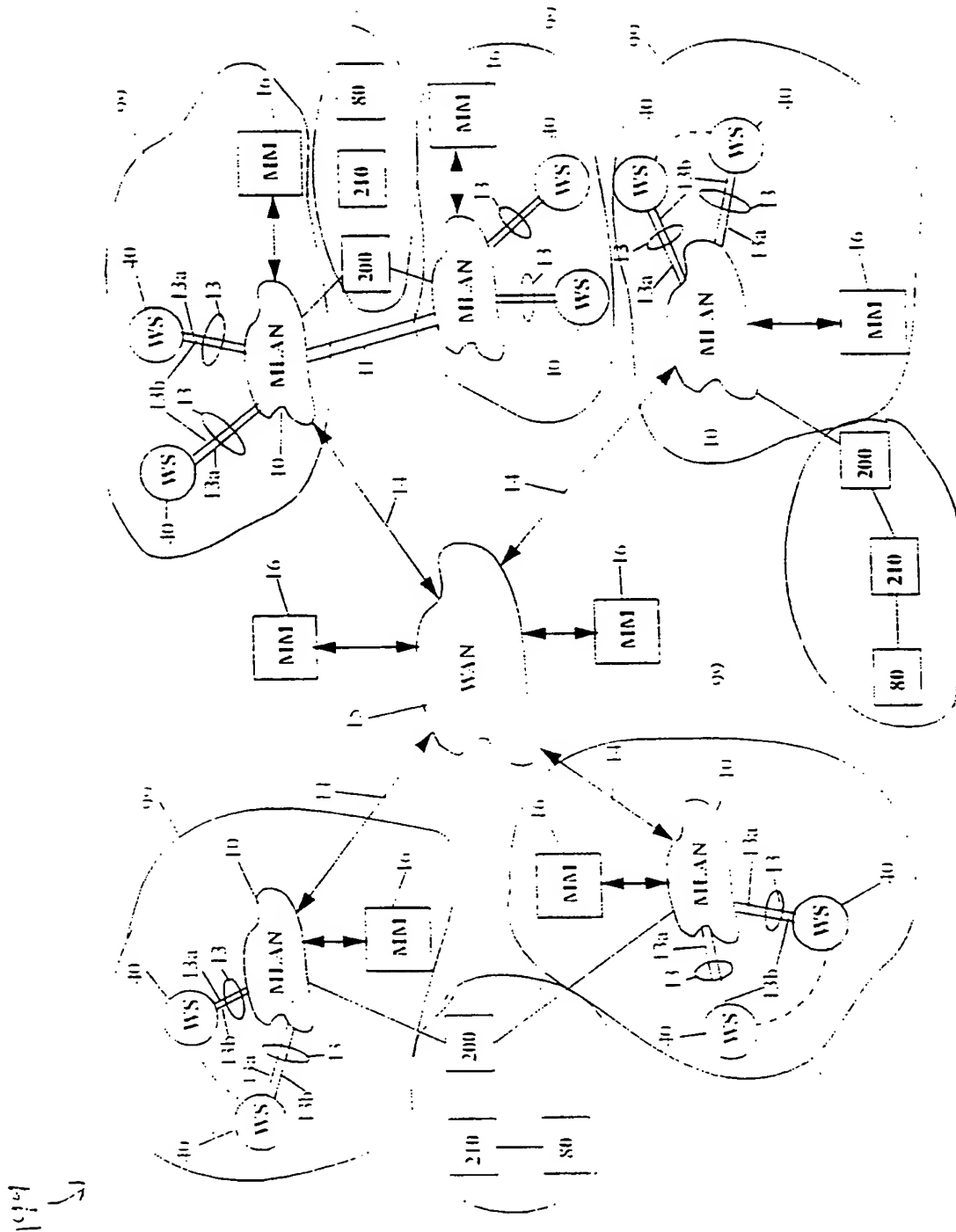


Fig. 2

3/49

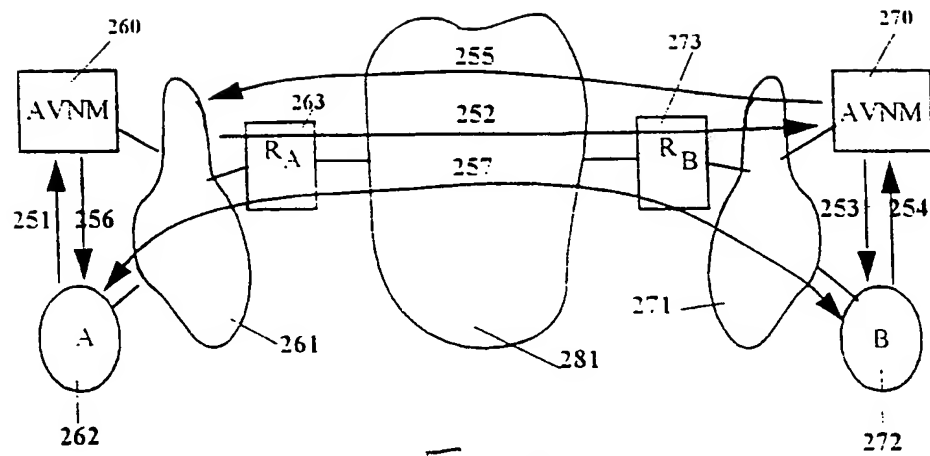


Fig. 3

4149

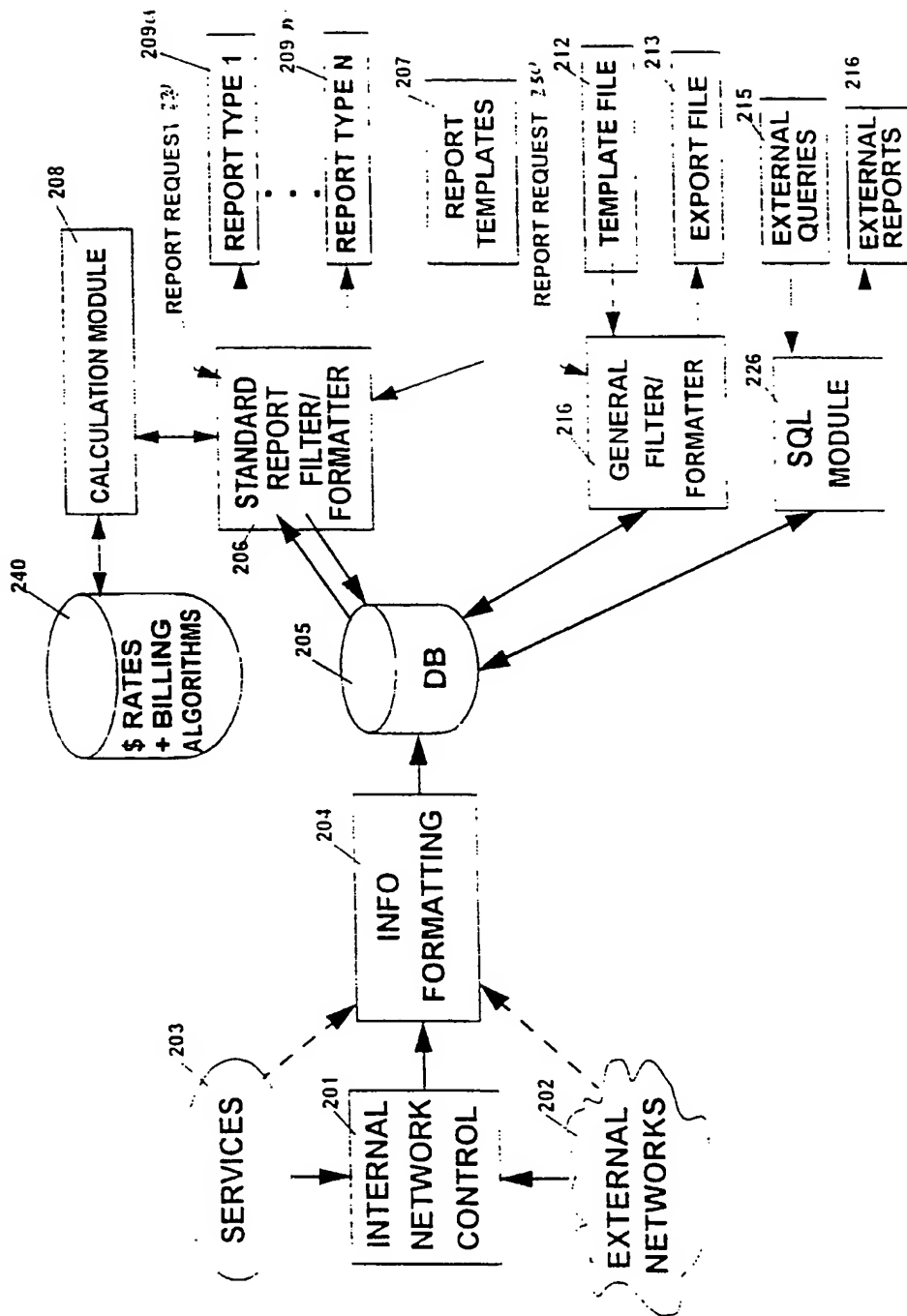


Fig. 4

5149

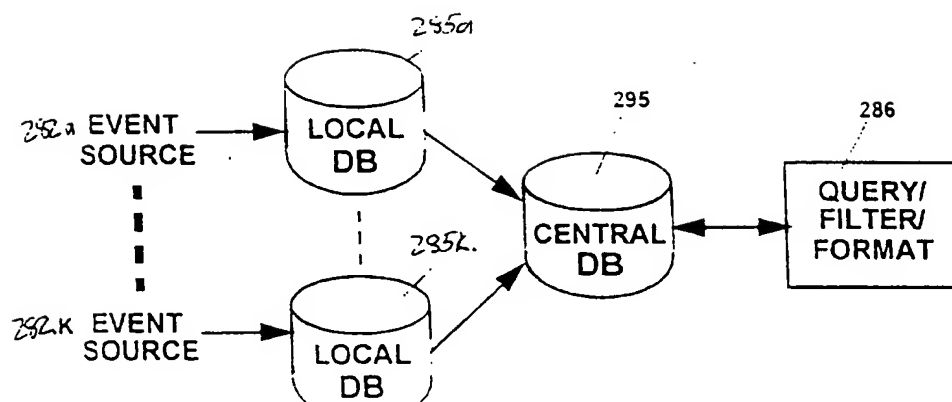


Fig. 5A

6149

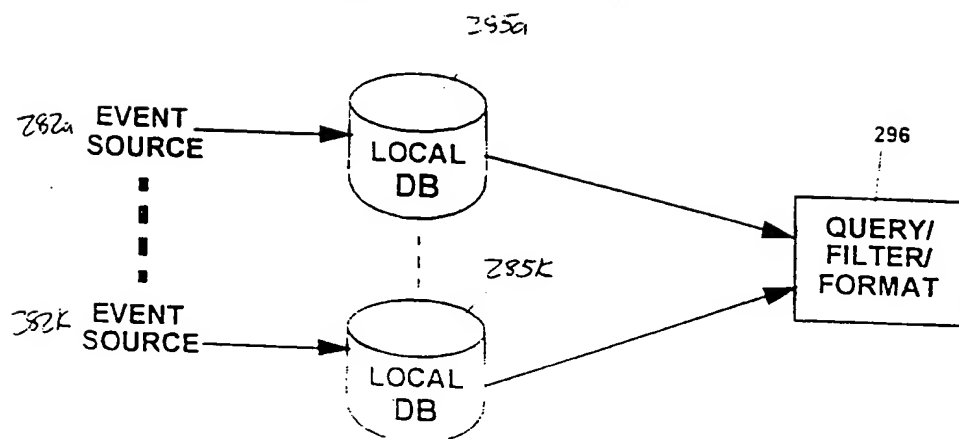


Fig. 5B

7/49

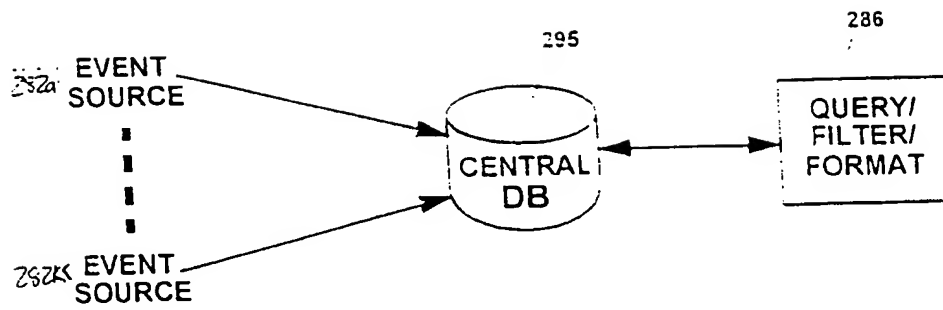


Fig. 5C

8/49

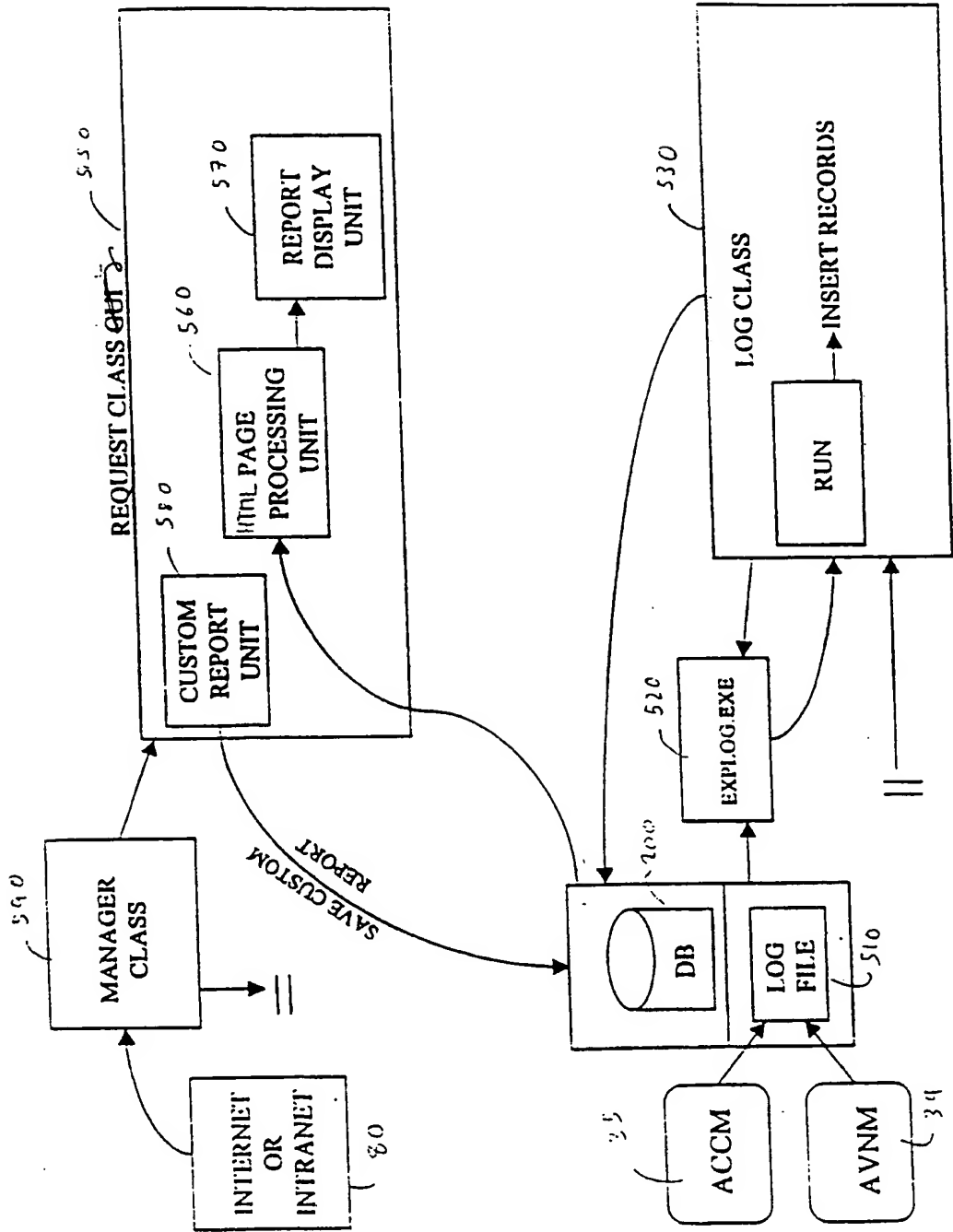


Fig. 6

9149

300a  
↗

CALL
LOGID LONG (AK)
CONFID LONG (IE)
CALLERID LONG (IE)
CALLERDEVICEID LONG
CALLERPORT TEXT(50)
CALLERMODE TEXT(50)
CALLERIDAVISTAR TEXT(50) (IE)
CALLERTRUNKPORT TEXT(50)
STARTTIME LONG (IE)
ENDTIME LONG (IE)
LANCALLS LONG
WANCALLS LONG
HOUR LONG
DAY LONG
WEEK LONG
MONTH LONG
LAN DURATION DOUBLE
WAN DURATION DOUBLE

CRVALUES
FNAME TEXT(50)
CRID LONG (IE)
FVALUE TEXT(50)

RVALUES
FNAME TEXT(50)
RID LONG (FK) (IE)
FVALUE TEXT(50)

REPORT
ID LONG
NAME TEXT(75)
DESCRIPTION TEXT(250)
ORD LONG
DISPLAY TEXT(50)
TYPEID LONG

REPORTDISPLAY
RID LONG (FK) (IE)
DID LONG (FK)

DISPLAY
ID LONG
Name TEXT(50)

REPORTFIELDS
RID LONG (FK) (IE)
FID LONG (IE)
ORD LONG

RAWDATA
RECORD MEMO
ID LONG (AK)
READ LONG

LAST
RID LONG (IE)
CRID LONG (IE)
ORD LONG

PARTICIPANTS
LOGID LONG (AK)
NAME TEXT(75)
DEVICEID LONG (IE)
CONFID LONG (IE)
SLOT TEXT(50)
CONFIDAVISTAR TEXT(50)
CALLIDAVISTAR TEXT(50)
PARTICIPANTPORT TEXT(50)
PARTICIPANTMODE TEXT(50)
PARTICIPANTTERMINALID TEXT(50) (IE)
STARTTIME LONG (IE)
ENDTIME LONG (IE)
DURATION DOUBLE
LANWAN TEXT(3)

Fig. 7A



10/49

300b  
5

LOGIN
USERID LONG (IE)
LOGID LONG (AK)
SERVICETYPE TEXT(50)
STARTTIME LONG (IE)
ENDTIME LONG (IE)
DURATION DOUBLE

CUSTOMREPORT
ID LONG
TITLE TEXT(75)
RID LONG
DATECONST LONG
DESCRIPTION TEXT(250)
DISPLAY TEXT(50)

WANNUMRENS
ID LONG
NUMBER TEXT(50)

FIELD
ID LONG
NAME TEXT(76)

CONFERENCE
ID LONG (AK)
LOGID LONG (IE)
STARTTIME LONG (IE)
ENDTIME LONG (IE)
DEVICEID LONG (IE)
CONFIDAVISTAR TEXT(50)

DEVICEUSAGE
DEVICEID LONG (IE)
STARTTIME LONG (IE)
ENDTIME LONG (IE)
DURATION DOUBLE
HOUR LONG
DAY LONG
MONTH LONG
WEEK LONG
LOGID LONG (AK)

USEN
ID LONG
NAME TEXT(200)

CALLEE
LOGID LONG (IE)
CALLEEID LONG (IE)
CALLEEDEVICEID LONG (IE)
CALLEEPORT TEXT(50)
CALLEEMODE TEXT(50)
CALLEETERMINALID TEXT(50) (IE)
CALLEETRUNKPORT TEXT(50)
CALLEEDAVISTAR TEXT(50)
LANCALLS LONG
WANCALLS LONG
LANDURATION DOUBLE
WANDURATION DOUBLE

CALLUSERS
ID LONG
CALLER LONG (IE)
CALLEE LONG (IE)
NAME TEXT(200)

SORTCHOICE
RID LONG (IE)
NAME TEXT(50)
VALUE TEXT(100)

DEVICE
ID LONG
Name TEXT(50)
Category TEXT(60)

Fig. 7B

1149

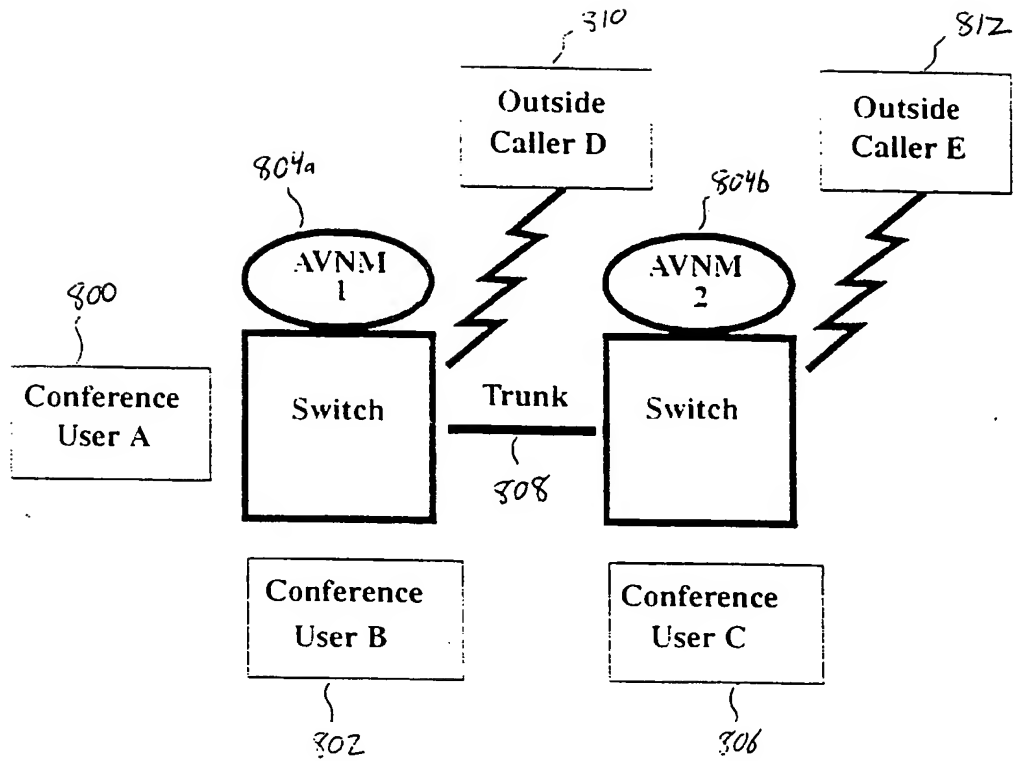
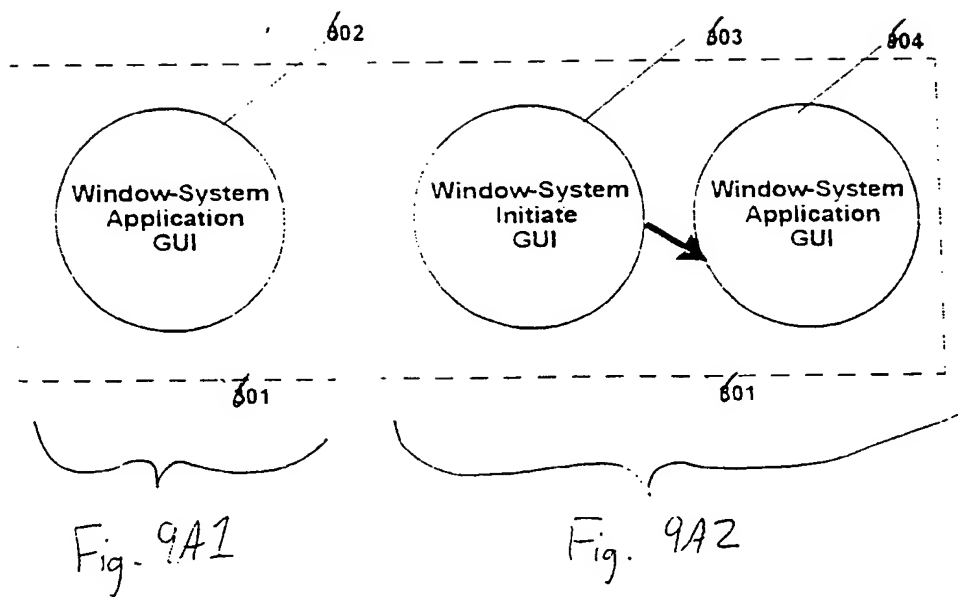
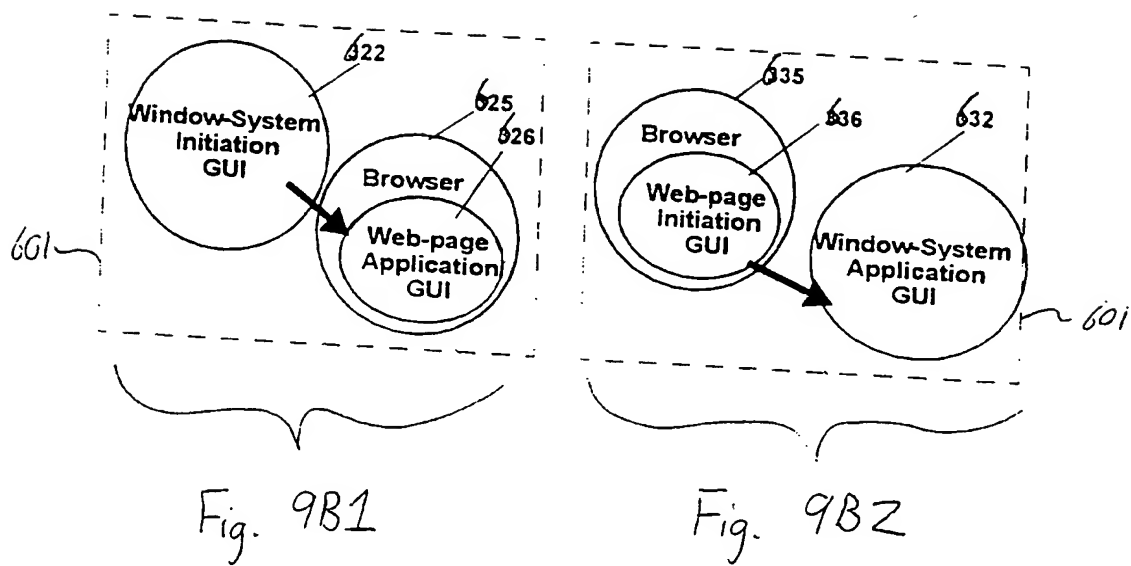


Fig. 8

12149



13149



14149

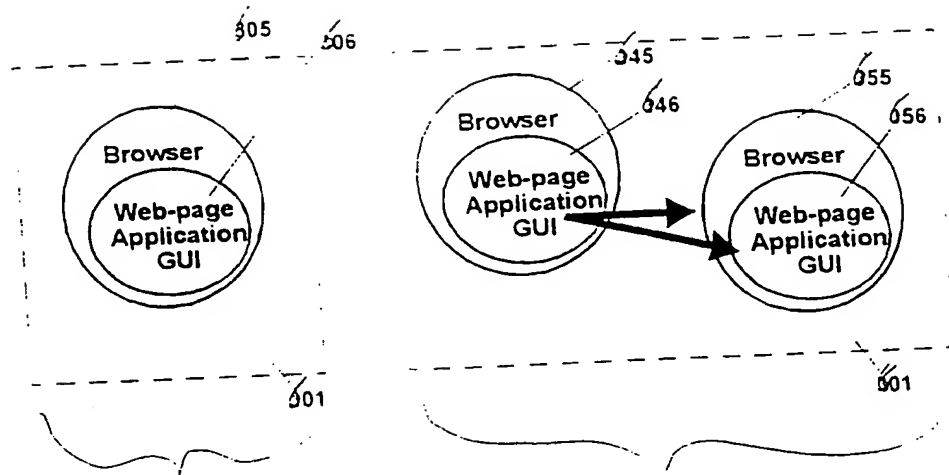


Fig. 9C1

Fig. 9C2

15149

**Data Management****Import**

Current Date Range of Imported Data: 04/13/1999 3:33 PM to 05/11/1999 2:29 PM

**Manual Import:**

Please choose an import method:

☒ Most Recent Log Records (records created after 05/11/1999 2:29 PM)

☐ Time Range: 1998 ▼ Jan ▼ 01 ▼ To 1998 ▼ Jan ▼ 01 ▼  
12 ▼ 00 ▼ AM ▼ 12 ▼ 00 ▼ PM ▼

Note: Existing records during a specific time range will be deleted before importing

**Automatic Import Settings:**☐ Automatically import daily at 11PM ▼1000  
↑

Fig. 10

16/49

Data ManagementDelete

Current Date Range of Imported Data: 04/13/1999 3:33 PM to 05/11/1999 2:29 PM

Import

Please choose criteria for deletion:

☒ Delete all records (WARNING - All existing data will be deleted!)

☐ Time Range: 1998 ▼ Jan ▼ 01 ▼ To 1998 ▼ Jan ▼ 01 ▼  
12 ▼ : 00 ▼ AM ▼ 12 ▼ : 00 ▼ AM ▼

Delete Records



1100

Fig. 11

17149

Standard Reports

## Standard Reports

### User Activity

#### Calls Between Users (2)

Detailed account of calls made between a user or group of users, and another user or group of users.

#### User Call Detail (2)

Detailed account of the calls made to (originate), from (receive), or to and from (originate and receive) a user or group of users.

#### Number Of Calls Completed by User (6)

Tabulates number of calls originated and/or received by users in a time period with breakdown of LAN and WAN calls

#### Number of Calls Completed by Time Period (6)

Tabulates number of calls originated and/or received by users in time periods over a specified time range with breakdown of LAN and WAN calls.

#### Call Duration (6)

Tabulates cumulative minutes of use for LAN and WAN calls originated and/or received by specified users during a time period.

### Resource Usage

#### Total Device Usage by Number of Calls (6)

Total number of inbound and outbound calls for a list of devices over a time range.

#### Total Device Usage by Duration (6)

Cumulative minutes of use (inbound and outbound) for a list of devices over a time range.

#### Total Device Usage by Time Period (6)

Cumulative minutes of use (inbound and outbound) for a list of devices in each time period over a range of time.

1200

Fig. 12



18/49

## Standard Reports

Set-Up

→ Menu

Calls Between Users

→ Set-up

### Set-Up

Report Information:

**Title:**

Calls Between Users

**Description:**

Detailed account of calls made between a user or group of users and another user or group of users.

Please select the data

**GROUP A:**All Users  
992 Training Class  
Alex Vasylenko  
Angela Kilpatrick**GROUP B:**All Users  
992 Training Class  
Alex Vasylenko  
Angela Kilpatrick**Time Range:**☒ This Month (1st - present)

Or

☐ 1999 May 01 To 1999 May 25  
12 00 AM 11 45 PM

Please select the order

**Sort Order:**

By User then Chronologically

Please select output display

**Display Output:**

Text Report

View Report

Fig. 13A

19/49

Report Title: Calls Between Users

Report Description: Detailed account of calls made between a user or group of users, and another user or group of users.

Type of Call: N/A

Time Range: 05/01/1999 12:00 AM - 05/31/1999 11:59 PM

Sort Order: By User then Chronologically

Number of Call Records Found: 37 (Displaying 1 - 37)  
Total Call Minutes: 0:23:31

Call Originator	LAN Call Recipient(s)	WAN Call Recipient(s)	Start Time	Duration
Angela Kilpatrick	Heather Davis-Receptionist		05/03/1999 7:35 AM	0:00:14
Angela Kilpatrick	Heather Davis-Receptionist, Eric Wood		05/03/1999 7:35 AM	0:00:23
Angela Kilpatrick	Heather Davis-Receptionist		05/03/1999 8:24 AM	0:00:29
Angela Kilpatrick	Heather Davis-Receptionist		05/03/1999 2:07 PM	0:00:41
Angela Kilpatrick	Heather Davis-Receptionist		05/03/1999 2:20 PM	0:00:17
Angela Kilpatrick	Heather Davis-Receptionist		05/03/1999 2:21 PM	0:01:13
Angela Kilpatrick	Heather Davis-Receptionist		05/04/1999 8:43 AM	0:00:31
Angela Kilpatrick	Heather Davis-Receptionist		05/04/1999 12:42 PM	0:00:18
Angela Kilpatrick	Heather Davis-Receptionist		05/04/1999 2:21 PM	0:00:48
Angela Kilpatrick	Heather Davis-Receptionist		05/05/1999 8:43 AM	0:00:05
Angela Kilpatrick	Heather Davis-Receptionist, Eric Horschman		05/05/1999 9:07 AM	0:01:18
Angela Kilpatrick	Heather Davis-Receptionist		05/06/1999 8:13 AM	0:00:26
Angela Kilpatrick	Heather Davis-Receptionist		05/07/1999 8:00 AM	0:01:00
Angela Kilpatrick	Heather Davis-Receptionist		05/07/1999 11:13 AM	0:00:14
Angela Kilpatrick	Chris Lauwers		05/07/1999 11:29 AM	0:00:07
Angela Kilpatrick	Mike Dainko		05/10/1999 11:25 AM	0:00:04
Angela Kilpatrick	Heather Davis-Receptionist		05/11/1999 8:22 AM	0:01:18
Heather Davis-Receptionist	Elle Wierenga, Angela Kilpatrick		05/03/1999 7:33 AM	0:02:04
Heather Davis-Receptionist	Angela Kilpatrick		05/05/1999 8:46 AM	0:00:37
Heather Davis-Receptionist	Angela Kilpatrick		05/05/1999 10:05 AM	0:00:11
Mike Dainko	Angela Kilpatrick		05/10/1999 11:29 AM	0:00:43
Diann Cupples		Heather Davis-Receptionist	05/10/1999 9:17 AM	0:00:38

E. 22

1350

20/49

Chris Lauwers		Diann Cupples	05/04/1999 12:47 PM	0:03:49
Heather Davis-Receptionist		Diann Cupples	05/11/1999 8:48 AM	0:01:36
Tammy Fresca	Chris Lauwers		05/05/1999 11:33 AM	0:00:04
Tammy Fresca	Chris Lauwers		05/05/1999 11:34 AM	0:00:07
Tammy Fresca	Chris Lauwers		05/05/1999 11:40 AM	0:00:02
Tammy Fresca	Chris Lauwers		05/06/1999 7:26 AM	0:00:03
Tammy Fresca	Lan Rupf, Chris Lauwers	Debbie Rosenkoetter	05/06/1999 7:34 AM	0:02:21
Tammy Fresca	Chris Lauwers		05/06/1999 7:36 AM	0:00:08
Tammy Fresca	Chris Lauwers		05/06/1999 7:39 AM	0:00:28
Tammy Fresca	Chris Lauwers		05/10/1999 12:44 PM	0:00:12
Chris Lauwers	Tammy Fresca		05/03/1999 2:28 PM	0:00:29
Chris Lauwers	Tammy Fresca		05/05/1999 12:29 PM	0:00:03
Chris Lauwers	Tammy Fresca		05/06/1999 7:38 AM	0:00:02
Chris Lauwers	Tammy Fresca		05/06/1999 12:35 PM	0:00:16
Heather Davis-Receptionist	Tammy Fresca		05/10/1999 8:52 AM	0:00:12
Total LAN Minutes: 0:23:34 Total WAN Minutes: 0:08:24				

↑  
1 1350

Fig. 13B

21149

**Standard Reports****Set-Up**

- ► Menu

User Call Detail

- ► Set-up

There are no records that match your set-up criteria. Please refine your setup.

**Report Information:****Title:**

User Call Detail

**Description:**

Detailed account of the calls made to (originate), from (receive), or to and

Please select the data

**Users:**All Users  
992 Training Class  
Alex Vasylenko  
Angela Kilpatrick

Please select the Type of Call

☒ Originate and Receive☐ Originate☐ Receive**Time Range:**☒ Last Month

Or

☐ 1999 Jun 01 To 1999 Jun 10  
12 00 AM 11 55 PM

Please select the order

**Sort Order:**

Chronologically

Please select the output display

**Display Output:**

Text Report

View Report

Fig. 14A

22149

Report Title: User Call Detail

Report Description: Detailed account of the calls made to (originate), from (receive), or to and from (originate and receive) a user or group of users.

Type of Calls: Originate and Receive

Time Range: 05/01/1999 12:00 AM - 05/31/1999 11:59 PM

Sort Order: Chronologically

Number of Call Records Found: 68 (Displaying 1 - 68)  
Total Call Minutes: 2:21:44

Call Originator	LAN Call Recipient(s)	WAN Call Recipient(s)	Start Time	Duration
Mike Dainko	CNN_Palo_Alto		05/10/1999 7:07 AM	0:01:29
Paul Gamberdella	Tammy Fresca, Mike Dainko	Outside Call, Outside Call	05/10/1999 7:11 AM	0:13:54
Mike Dainko		Josh Rosenblum	05/10/1999 7:25 AM	0:00:10
Mike Dainko		Josh Rosenblum	05/10/1999 7:25 AM	0:00:17
Mike Dainko		Matt Basham	05/10/1999 7:26 AM	0:02:16
Mike Dainko		Outside Call	05/10/1999 7:34 AM	0:02:03
Mike Dainko		Debbie Rosenkoetter	05/10/1999 7:38 AM	0:20:00
Mike Dainko		Debbie Rosenkoetter	05/10/1999 7:58 AM	0:11:20
Debbie Rosenkoetter		Mike Dainko	05/10/1999 8:09 AM	0:00:02
Debbie Rosenkoetter		Mike Dainko	05/10/1999 8:09 AM	0:02:24
Debbie Rosenkoetter		Mike Dainko	05/10/1999 8:12 AM	0:04:44
Debbie Rosenkoetter		Mike Dainko	05/10/1999 8:23 AM	0:00:07
Debbie Rosenkoetter		Mike Dainko	05/10/1999 8:23 AM	0:01:37
Mike Dainko		Josh Rosenblum, Debbie Rosenkoetter	05/10/1999 8:25 AM	0:01:21
Mike Dainko		Debbie Rosenkoetter	05/10/1999 8:26 AM	0:01:27
Mike Dainko		Debbie Rosenkoetter	05/10/1999 8:28 AM	0:00:19
Debbie Rosenkoetter		Mike Dainko	05/10/1999 8:28 AM	0:00:08
Debbie Rosenkoetter		Mike Dainko	05/10/1999 8:29 AM	0:00:08
Debbie Rosenkoetter		Mike Dainko	05/10/1999 8:29 AM	0:01:01
Mike Dainko		Debbie Rosenkoetter	05/10/1999 8:30 AM	0:02:44
Debbie Rosenkoetter		Mike Dainko	05/10/1999 8:33 AM	0:00:08
Debbie Rosenkoetter		Mike Dainko	05/10/1999 8:34 AM	0:01:33

1450

23/49

Debbie Rosenkoetter		Mike Dainko	05/10/1999 8:36 AM	0:00:53
Mike Dainko		Debbie Rosenkoetter	05/10/1999 8:37 AM	0:00:47
Debbie Rosenkoetter		Mike Dainko	05/10/1999 8:37 AM	0:00:08
Debbie Rosenkoetter		Mike Dainko	05/10/1999 8:38 AM	0:00:30
Debbie Rosenkoetter		Mike Dainko	05/10/1999 8:38 AM	0:00:01
Mike Dainko		Outside Call	05/10/1999 8:39 AM	0:00:04
Debbie Rosenkoetter		Mike Dainko	05/10/1999 8:39 AM	0:00:31
Mike Dainko		Debbie Rosenkoetter	05/10/1999 8:40 AM	0:00:51
Mike Dainko		Ian O'Brien	05/10/1999 8:41 AM	0:07:07
Mike Dainko		Outside Call	05/10/1999 8:52 AM	0:00:12
Brian Wood	Mike Dainko		05/10/1999 9:00 AM	0:00:41
Brian Wood	Mike Dainko		05/10/1999 9:03 AM	0:01:55
Brian Wood	Mike Dainko	Outside Call	05/10/1999 9:05 AM	0:01:13
Mike Dainko	Brian Wood		05/10/1999 9:10 AM	0:00:03
Brian Wood	Mike Dainko		05/10/1999 9:15 AM	0:00:06
Brian Wood	Mike Dainko		05/10/1999 9:26 AM	0:00:03
Mike Dainko		Outside Call	05/10/1999 9:45 AM	0:00:13
Tanya Tran	Mike Dainko		05/10/1999 9:57 AM	0:00:08
Brian Wood	Mike Dainko		05/10/1999 10:02 AM	0:00:03
Mike Dainko		Outside Call	05/10/1999 11:11 AM	0:00:49
Mike Dainko		Debbie Rosenkoetter	05/10/1999 11:12 AM	0:02:11
Mike Dainko		Outside Call	05/10/1999 11:22 AM	0:00:36
Angela Kilpatrick	Mike Dainko		05/10/1999 11:25 AM	0:00:04
Mike Dainko	Angela Kilpatrick		05/10/1999 11:29 AM	0:00:43
Mike Dainko	Steve Arisco		05/10/1999 11:30 AM	0:00:11
Ian O'Brien		Mike Dainko	05/10/1999 11:31 AM	0:01:18
Mike Dainko		Outside Call	05/10/1999 11:33 AM	0:00:16
Mike Dainko	Pearl O'Brien		05/10/1999 11:33 AM	0:01:42
Mike Dainko	Pearl O'Brien		05/10/1999 11:37 AM	0:02:17
Pearl O'Brien	Mike Dainko, Mike Dainko, Jean Dominguez	Outside Call	05/10/1999 11:39 AM	0:16:52

Fid. UR

1450

24149

Mike Dainko		Outside Call	05/10/1999 11:43 AM	0:00:13
Brian Wood	Mike Dainko		05/10/1999 12:05 PM	0:00:03
Mike Dainko		Outside Call	05/10/1999 4:13 PM	0:04:48
Mike Dainko		Outside Call, Outside Call	05/10/1999 4:18 PM	0:01:03
Mike Dainko		Outside Call	05/10/1999 4:19 PM	0:00:42
Mike Dainko		Outside Call	05/10/1999 4:20 PM	0:00:56
Mike Dainko		Outside Call	05/10/1999 4:22 PM	0:01:02
Mike Dainko		Outside Call	05/10/1999 4:25 PM	0:14:33
Mike Dainko	Chris Lauwers		05/10/1999 4:33 PM	0:00:08
Mike Dainko	Alex Vasylenko		05/10/1999 4:33 PM	0:00:11
Mike Dainko	Chris Lauwers		05/10/1999 4:33 PM	0:00:51
Outside Call	Mike Dainko		05/10/1999 4:41 PM	0:00:47
Mike Dainko		Outside Call	05/10/1999 4:47 PM	0:00:13
Mike Dainko		Outside Call	05/10/1999 4:48 PM	0:03:59
Mike Dainko		Outside Call	05/10/1999 4:52 PM	0:00:43
Mike Dainko	Steve Arisco		05/10/1999 4:53 PM	0:00:03
Total LAN Minutes: 1:31:05 Total WAN Minutes: 2:26:45				

1450

Fig. 14B

25/49

Standard Reports	Set-Up	Menu
	Number of Calls Completed by User	Set-up

## Report Information:

Title:

Number of Calls Completed by User

Description:

Tabulates number of calls originated and/or received by users in a time

Please select the data

Users:

All Users  
992 Training Class  
Alex Vasylenko  
Angela Kilpatrick

Please select the Type of Call

- ☒ Originate and Receive  
☐ Originate  
☐ Receive

## Time Range:

☒ Last Month

Or

☐ 1999 May 01 To 1999 May 25  
12:00 AM 11:55 PM

Please select the order

Sort Order:

Ascending # of LAN and WAN Calls

Please select the output display

Display Output:

Stacked Bar Chart

View Report

Fig. 15A



26149

## Standard Reports

## View Report

Number of Calls  
Completed by User

Report Title: Number of calls Completed by User

Print Format

Report Description: Tabulates number of calls originated and/or received by users in a time period with breakdown of LAN and WAN calls.

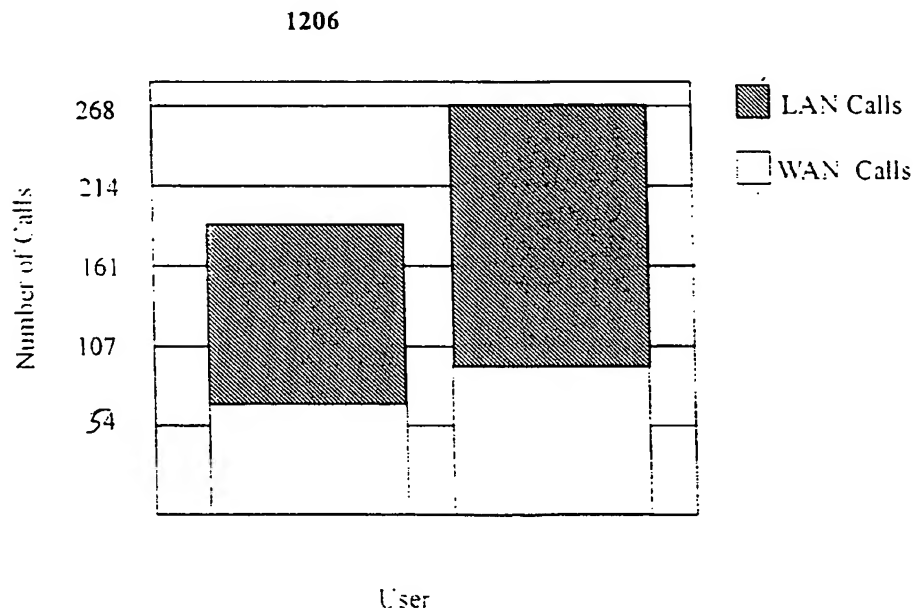
Save as Custom

Type of Call: Originate and Receive

Modify

Time Range: 04/01/1999 12:00 AM - 04/30/1999 11:59 PM

Sort Order: Ascending # of LAN Calls



1550

Fig. 15B

27/49

**Standard Reports** **Set-Up** ► Menu

**Number of Calls Completed by Time Period** ► Set-up

**Report Information:**

**Title:** Number of Calls Completed by T

**Description:** 1601 Tabulates number of calls originated and/or received by users in time

Please select the data

**Users:** 1602

All Users  
992 Training Class  
Alex Vasylenko  
Angela Kilpatrick

Please select the Type of Call

☒ Originate and Receive 1603  
☐ Originate  
☐ Receive

**Time Range:**

☒ Last Month 1604

Or

☐ 1999 May 01 To 1999 May 25  
12 00 AM 11 45 PM

**Time Period:** Day 1301

Please select the order

**Sort Order:** Time Period 1605 704

Please select the output display

**Display Output:** 1606 Bar Chart View Report

1600

Fig. 16A

28/49

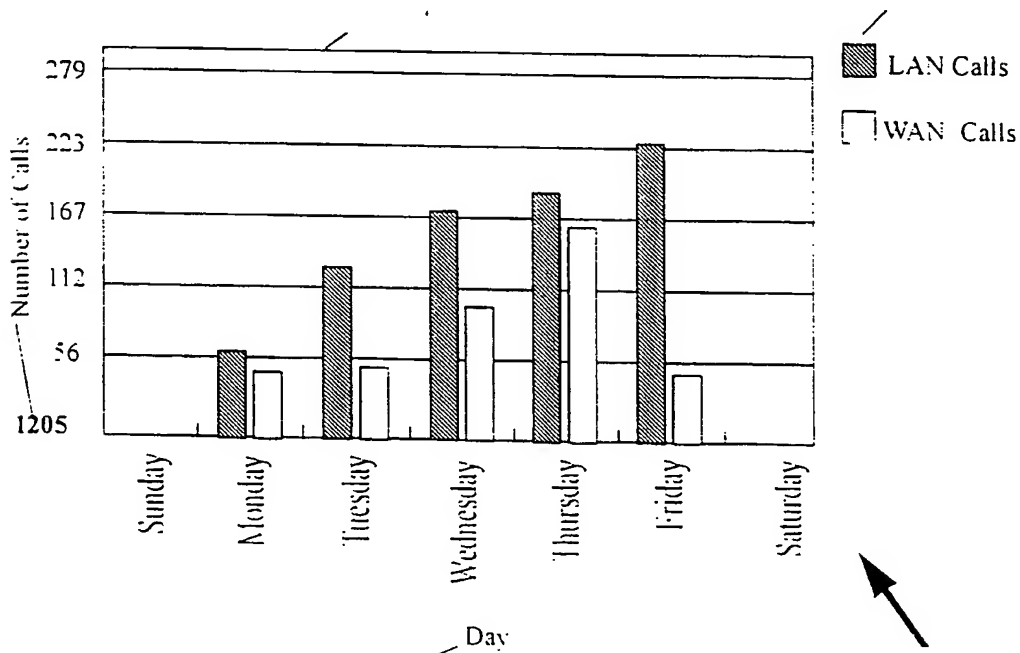
**Standard Reports****View Report**Number of Calls  
Completed by Time Period**Report Title:** Number of calls Completed by Time Period**Print Format****Report Description:** Tabulates number of calls originated and/or received by users in time periods over a specified time range with breakdown of LAN and WAN calls.**Save as Custom****Type of Call:** Originate and Receive**Modify****Time Range:** 04/01/1999 12:00 AM - 04/30/1999 11:59 PM**Sort Order:** Time Period

Fig. 16B

29/49

Standard Reports	Set-Up
	▶ Menu ▶ Set-up
Call Duration	

**Report Information:**

**Title:** Call Duration

**Description:** 1701 Tabulates cumulative minutes of use for LAN and WAN calls originated and/or

Please select the data

**Users:** 1702

All Users	▲
992 Training Class	
Alex Vasylenko	
Angela Kilpatrick	▼

Please select the Type of Call 1703

☒ Originate and Receive  
☐ Originate  
☐ Receive

**Time Range:** 1704

☒ Last Month ▼

Or

☐ 1999 ▼ May ▼ 01 ▼ To 1999 ▼ May ▼ 25 ▼  
12 ▼ 00 ▼ AM ▼ 11 ▼ 45 ▼ PM ▼

Please select the order

**Sort Order:** 1705 Descending # of LAN Calls ▼

Please select the output display

**Display Output:** 1706 Bar Chart ▼ View Report

1700

Fig. 17A

30/49

## Standard Reports

## View Report

Call Duration

Print Format

Report Title:

Call Duration

Report Description:

Tabulates cumulative minutes of use for LAN and WAN calls originated and/or received by specified users during a time period.

Save as Custom

Type of Call:

Originate and Receive

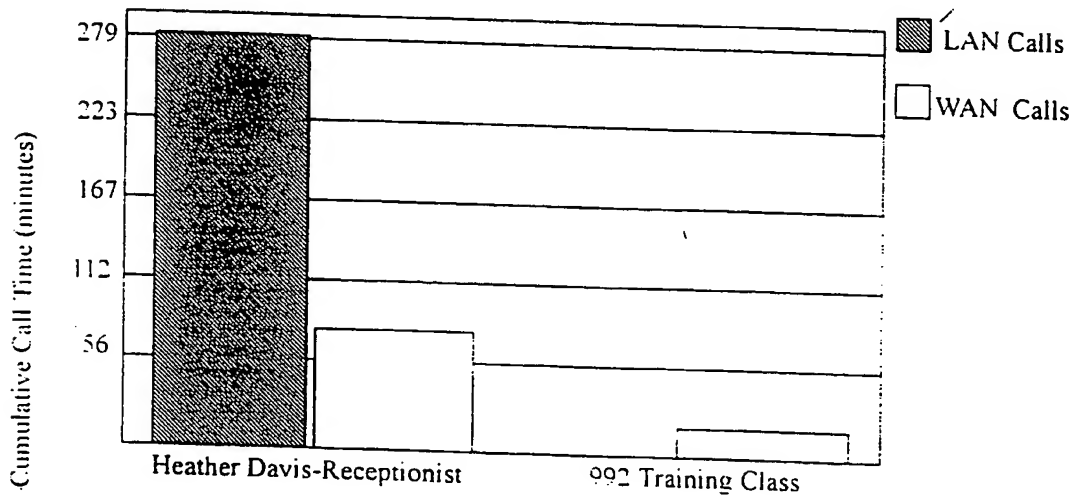
Modify

Time Range:

04/01/1990 12:00 AM - 04/30/1990 11:59 PM

Sort Order:

Descending # of LAN Calls



User



1750

Fig-17B

3-14-9

**Standard Reports****View Report**

Call Duration

**Report Title:** Call Duration**Print Format****Report Description:** Tabulates cumulative minutes of use for LAN and WAN calls originated and/or received by specified users during a time period.**Save as Custom****Type of Call:** Originate and Receive**Modify****Time Range:** 04/01/1999 12:00 AM - 04/30/1999 11:59 PM**Sort Order:** Descending # of LAN Calls

User	LAN Calls	WAN Calls
Greg Paxton	60	94
Jan Afridi	117	161
Eric Wood	171	208
Paul Gamberdella	208	240
Brian Wood	392	444
Jim Hughes	1122	792
<b>Total</b>	<b>2070</b>	<b>1939</b>


  
1750

Fig. 17C

32/49

**Report Title:** Call Duration

**Report Description:** Tabulates cumulative minutes of use for LAN and WAN calls originated and/or received by specified users during a time period.

**Type of Call:** Originate

**Time Range:** 05/01/1999 12:00 AM - 05/31/1999 11:59 PM

**Sort Order:** Descending # of LAN Calls

User	LAN Calls	WAN Calls
Greg Paxton	60	94
Jan Afridi	117	61
Eric Wood	171	208
Paul Gamberdella	208	240
Brian Wood	392	444
Jim Hughes	1122	792
Total	2070	1939


 1750

Fig. 17D

33/49

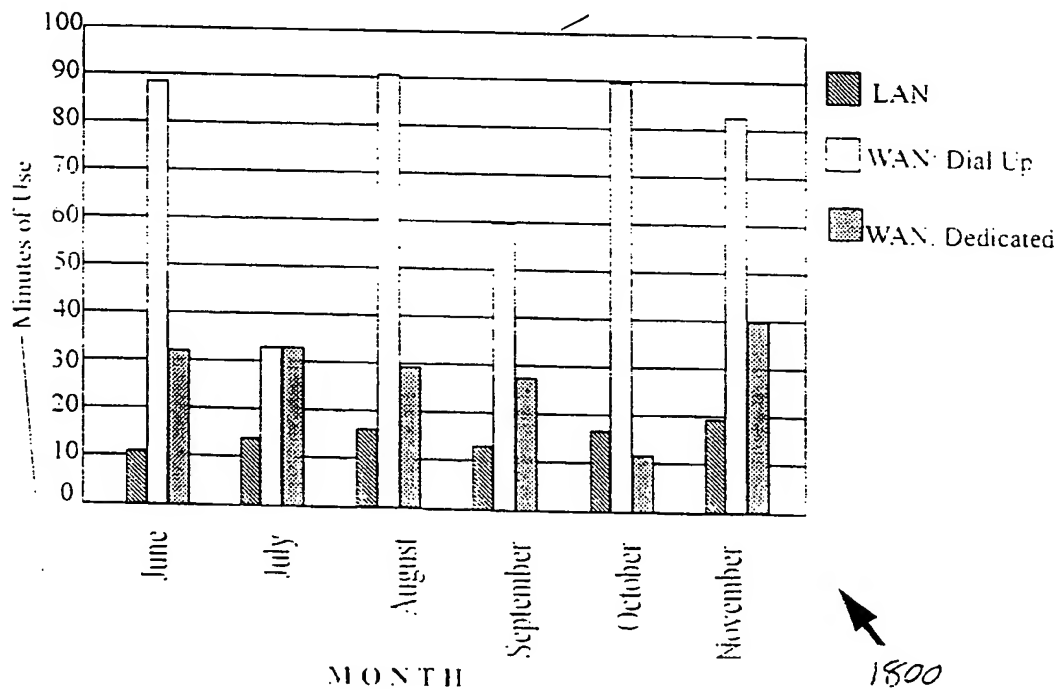
**Standard Reports****View Report**User Call Total  
by Time Period**Report Title:** User Call Total by Time Period**Report Description:** Calculates the minutes of use for a user (or group of users) over a specified period of time.**Type of Call:** Originate or Receive**Time Range:** 06/01/1999 12:00 AM - 11/30/1999 11:59 PM**Sort Order:** Time Period

Fig. 18A



34149

## Standard Reports

[View Report](#)

Network Availability  
by Numbers of Calls

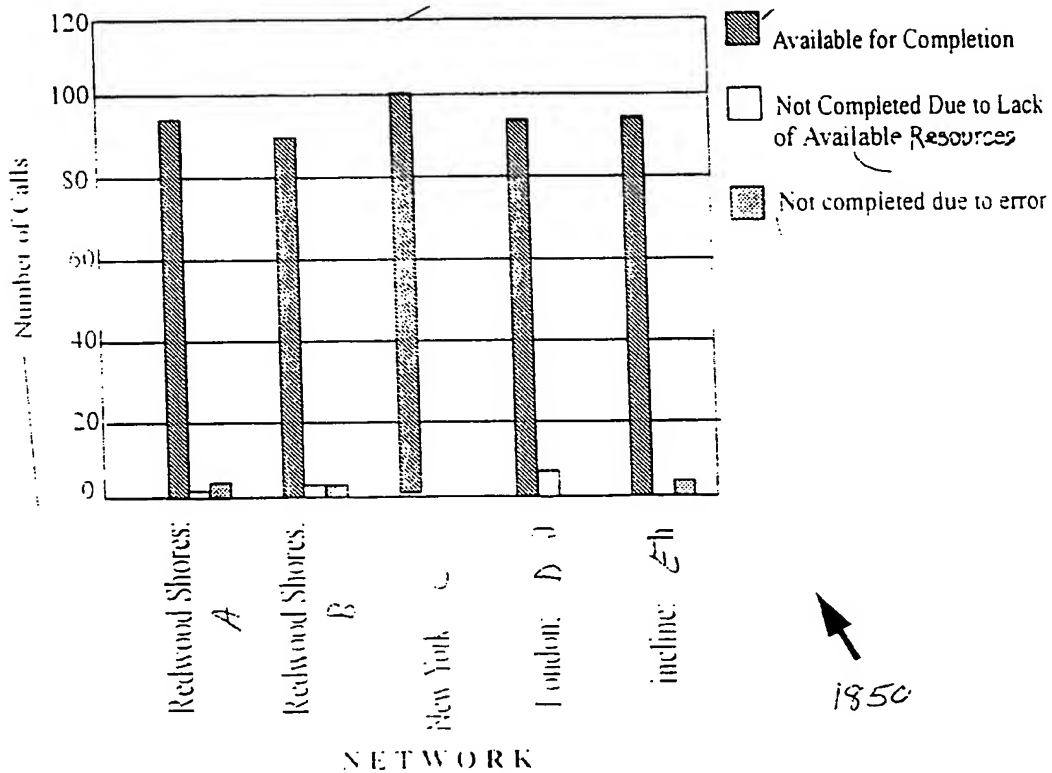
**Report Title:** Network Availability by Numbers of Calls

**Report Description:** Calculates the number of calls available for completion the number of calls not completed due to unavailable resources, and the number of calls not completed due to Avistar network error

**Type of Call:** N/A

**Time Range:** 06/01/1999 12:00 AM - 11/30/1999 11:59 PM

**Sort Order:** Avistar network



1850

Ex 18B

35/49

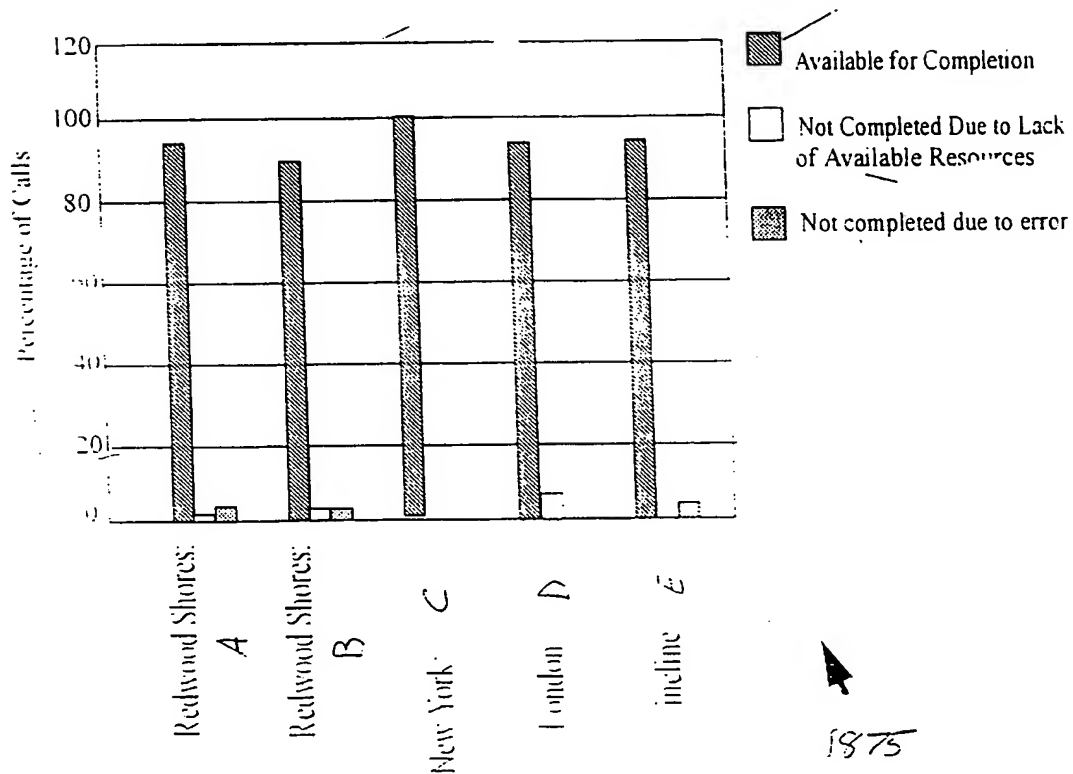
**Report Title:** Network Availability by Percentages of Calls

**Report Description:** Calculates the percentage of calls available for completion the number of calls not completed due to unavailable resources, and the number of calls not completed due to Avistar network error

**Type of Call:** N/A

**Time Range:** 10/01/1999 12:00 AM - 11/30/1999 11:59 PM

**Sort Order:** Avistar network



1875

Fig. 18c

36/49

## Standard Reports

Set-Up

Menu

Total Device Usage by  
Number of Calls

### Report Information:

**Title:** Total Device Usage by number of C**Description:** Total number of inbound and outbound  
calls for a list of devices over a time

Please select the data

**Devices:**

All Devices	▲
ccone	
cctwo	
Agpt1	▼

**Time Range:** ☒ Last Month ▼

Or

☐ 1999 ▼ Jun ▼ 01 ▼ To 1999 ▼ Jun ▼ 08 ▼  
12 ▼ 00 ▼ AM ▼ 11 ▼ 45 ▼ PM ▼

Please select the order

**Sort Order:** Device Category (Gateways or quads) ▼

Please select output display

**Display Output:** Bar Chart ▼ View Report

Fig. 19A

1900

37/49

## Standard Reports

## Set-Up

Total Device Usage by  
Number of Calls

Print Format

**Report Title:** Total Device Usage by Number of Calls

**Report Description:** Total number of inbound and outbound calls to a list of devices over a time range.

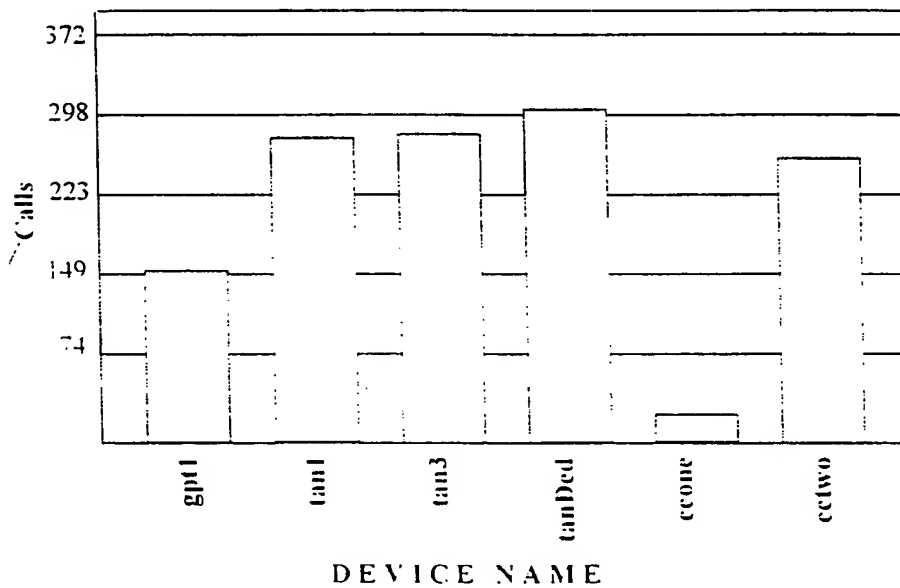
Save as Custom

**Type of Call:** N/A

Modify

**Time Range:** 04/01/1999 12:00 AM - 04/30/1999 11:59 PM

**Sort Order:** Device Category (Gateways or quads)



1950

Fig. 19B

38/49

Standard Reports		Set-Up	Menu
		Total Device Usage by Duration	Set-up

Report Information:

**Title:** Total Device Usage by Duration

**Description:** Cumulative minutes of use (inbound and outbound) for a list of devices over a

Please select the data

**Devices:** All Devices  
ccone  
cctwo  
Agpt1

**Time Range:** ☒ Last Month

Or

☐ 1999 May 01 To 1999 May 25  
12:00 AM To 11:45 PM

Please select the order

**Sort Order:** Device

Please select output display

**Display Output:** Text Report View Report

2000

Fig. 20A

39/49

**Standard Reports****View Report**Total Device Usage by  
Duration

Report Title:

Total Device Usage by Duration

**Print Format**

Report Description:

Cumulative minutes of use (inbound and  
outbound) for a list of devices over a  
time range.**Save as Custom**

Type of Call:

N/A

**Modify**

Time Range:

04/01/1999 12:00 AM - 04/30/1999 11:59 PM

Sort Order:

Device

**Device Name Minutes in Use**

cctwo	679
gpt1	209
tanDed	800

Page: [1]

Fig. 20B

2050

40/49

# Standard Reports

Set-Up

Menu

Total Device Usage by Time Period

**Report Information:****Title:-**

Total Device Usage by Time Period

**Description:**

Cumulative minutes of use (inbound and outbound) for a list of devices in each

Please select the data

**Devices:**

All Devices	▲
ccone	
cctwo	
Agpt1	▼

**Time Range:**☒

Last Week (Sunday - Saturday)

▼

Or

☐

1999 ▼ May ▼ 01 ▼ To 1999 ▼ May ▼ 25 ▼

12 ▼ 00 ▼ AM ▼ 11 ▼ 45 ▼ PM ▼

**Time Period:**

Hour ▼

Please select the order

**Sort Order:**

Time Period

▼

Please select output display

**Display****Output:**

Bar Chart

▼

View Report

2100

Fig. 21A

41/49

## Standard Reports

## View Report

Total Device Usage by  
Time Period

Report Title: Total Device Usage by Time Period

Print Format

Report Description: Cumulative minutes of use (inbound and  
outbound) for a list of devices in each  
time period over a range of time.

Save as Custom

Type of Call: N/A

Modify

Time Range: 01/01/1999 12:00 AM - 05/25/1999 4:37 PM

Sort Order: Time period

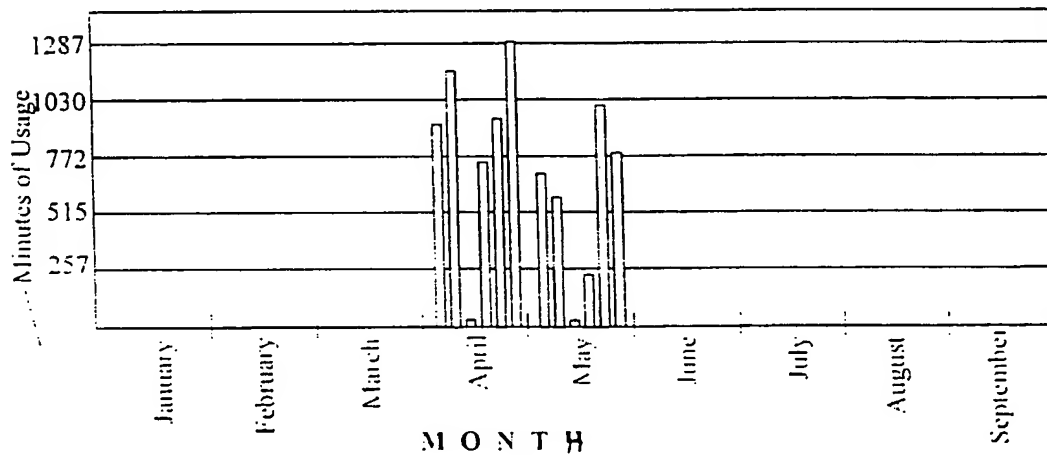


Fig. 21B

2150



42/49

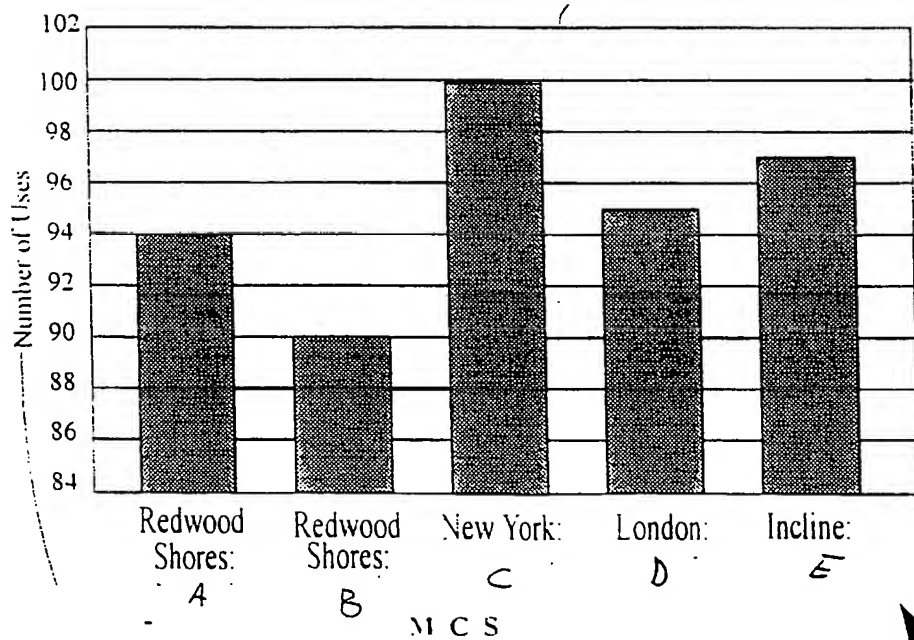
**Standard Reports****View Report****Conference Center Usage  
by Number of Uses****Report Title:** Conference Center usage by Number of Uses**Report Description:** Calculate the number of times the specified conference center is used.**Type of Call:** N/A**Time Range:** 06/01/1999 12:00 AM - 11/30/1999 11:59 PM**Sort Order:** Avistar network

Fig. 22A

2200

43/49

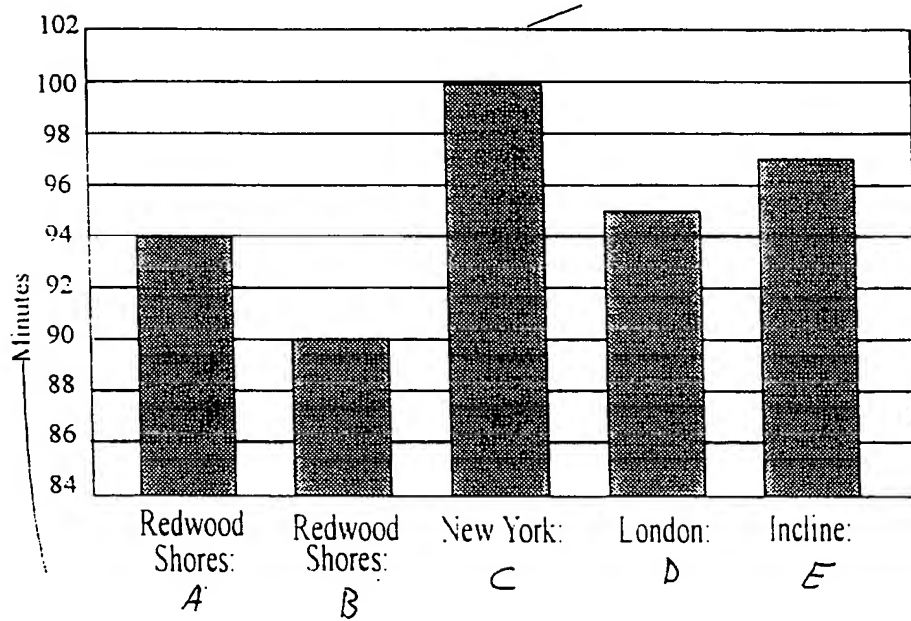
**Standard Reports****View Report**Conference Center Usage  
by Cumulative Time Used**Report Title:** Conference Center Usage by Cumulative Time Used**Report Description:** Calculates the cumulative time the specified  
conference center is used.**Type of Call:** N/A**Time Range:** 06/01/1999 12:00 AM - 11/30/1999 11:59 PM**Sort Order:** Avistar network

Fig. 22B

44149

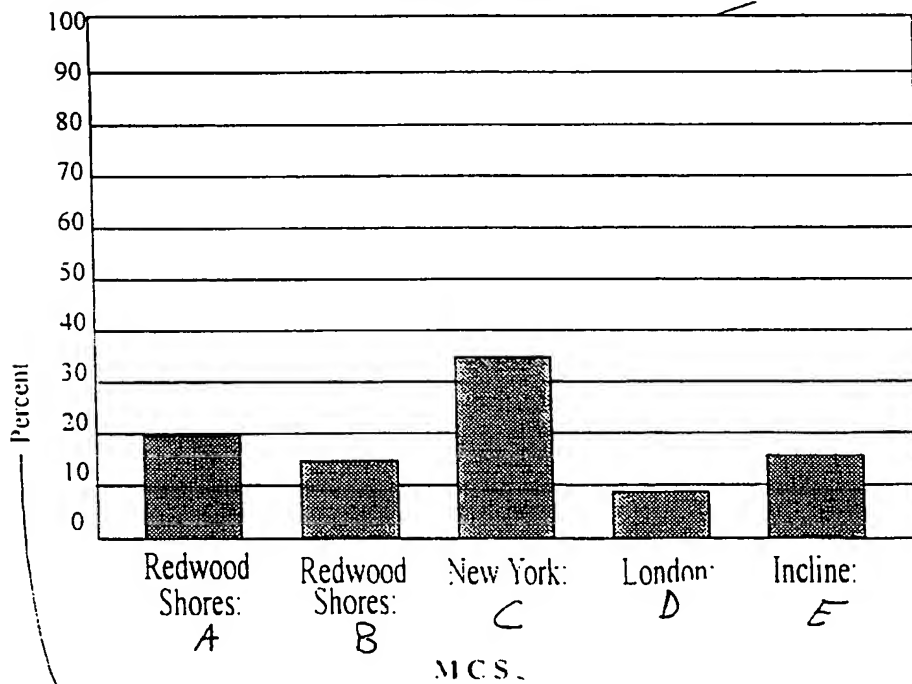
**Standard Reports****View Report****Report Title:** Conference Center Busy by Percentage of Attempted Us**Report Description:** center on the specified Avistar network was busy when it was called.**Type of Call:** N/A**Time Range:** 06/01/1999 12:00 AM - 11/30/1999 11:59 PM**Sort Order:** Avistar network

Fig. 32C

2250

45/49

## Standard Reports

## View Report

### Conference Call Availability

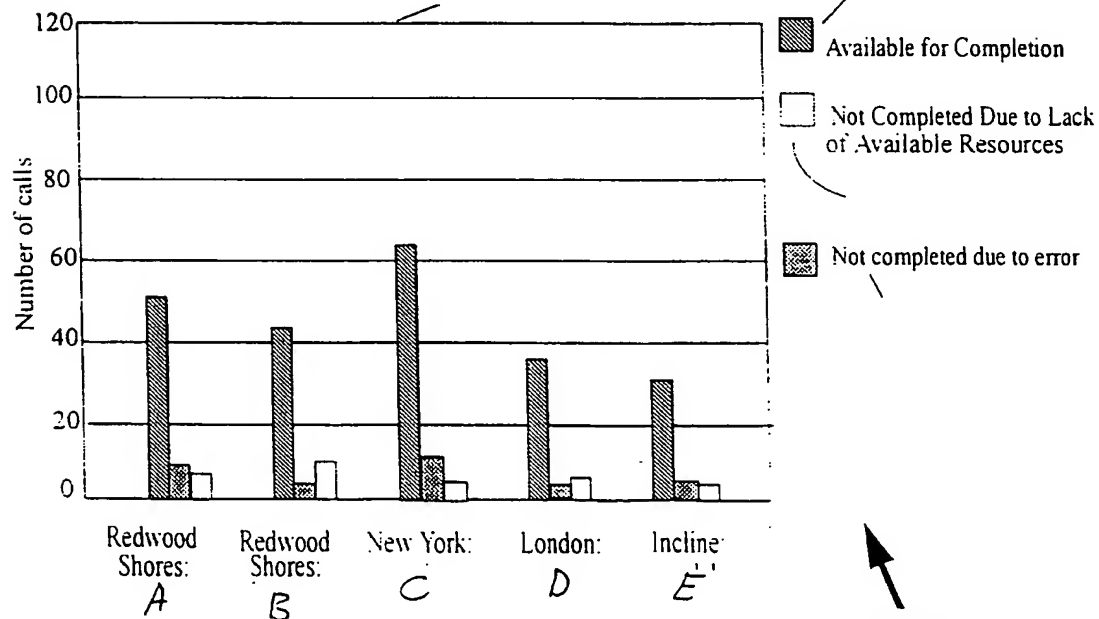
**Report Title:** Conference Call Availability

**Report Description:** Calculate the number of conference calls available for completion the number of conference calls not completed due to unavailable resources, and the number of calls not completed due to Avistar network error.

**Type of Call:** N/A

**Time Range:** 06/01/1999 12:00 AM - 11/30/1999 11:59 PM

**Sort Order:** Avistar network



2275

Fig. 22D

46/49

$$\begin{array}{r} 2290 \\ 2290 \\ \hline \end{array}$$

Fig. 32E

## Frank Busics Report

### Summary for Dallas:texas3

[illegible]

### Summary for Eton:walrus

Avistar Switch	5:00am	6:00am	7:00am	8:00am	9:00am	10:00am	11:00am	12:00pm	1:00pm	2:00am	3:00pm	4:00pm	5:00pm	6:00pm
Redwood Shores: A	1	0	0	0	0	3	4	5	10	12	10	6	0	0
Redwood Shores: A	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Redwood Shores: B	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Redwood Shores: B	0	0	0	0	0	0	0	0	0	0	0	0	0	0
New York: C	0	0	0	0	0	1	2	3	1	3	4	6	2	0
London: D	0	0	0	0	0	0	0	0	0	0	0	1	2	3

47/49

Custom Reports

## My Custom Reports

### Menu

The Custom Reports listed below have been saved To  
create a Custom Report, start with a Standard Report or a Custom Report, modify any report settings,  
then click the "save as custom" button.

#### PA Sales/AD - Last Month Call Duration [LB]

Created: 06/09/1999

Tabulates cumulative minutes of use for LAN and WAN calls originated and/or received by specified users during a time period.

[delete]

#### mac stacked Number Of Calls Completed by User [LB]

Created: 06/03/1999

netscape 4.0 - mac - stacked report

[delete]

#### Number of Calls Completed by Time Period [LB]

Created: 06/03/1999

Mac i.e. 4.0 stacked chart

[delete]

#### Number Of Calls Completed by User - [LB]

Created: 06/03/1999

Mac i.e. 4.0 bar chart saved report - print version working also.

[delete]

#### User Call Detail - mac text i.e. 4.0 [LB]

Created: 06/03/1999

Detailed account of the calls made to (originate), from (receive), or to and from (originate and receive) a user or group of users.

[delete]

#### MAC - Number of Calls Completed by Time Period [LB]

Created: 05/28/1999

MAC - Tabulates number of calls originated and/or received by users in time periods over a specified time range with breakdown of LAN and WAN calls.

[delete]

#### mac - Number Of Calls Completed by User [LB]

Created: 05/28/1999

MAC - Tabulates number of calls originated and/or received by users in a time period with breakdown of LAN and WAN calls

[delete]

#### Number Of Calls Completed by User [LB]

Created: 05/28/1999

Tabulates number of calls originated and/or received by users in a time period with breakdown of LAN and WAN calls

[delete]

#### User Call Detail - saving on the mac [LB]

Created: 05/28/1999

This report is generated and saved from a mac. Detailed account of the calls made to (originate), from (receive), or to and from (originate and receive) a user or group of users.

[delete]

#### - Mac Total Device Usage by Duration [LB]

Created: 06/03/1999

Cumulative minutes of use (inbound and outbound) for a list of devices over a time range.

[delete]

#### Total Device Usage by Number of Calls [LB]

Created: 06/03/1999

netscape 4.0 mac - text report

[delete]

#### Total Device Usage by Duration - mac testing more [LB]

Created: 05/28/1999

mac - Cumulative minutes of use (inbound and outbound) for a list of devices over a time range.

[delete]

#### Total Device Usage by Duration [LB]

Created: 04/16/1999

Cumulative minutes of use (inbound and outbound) for a list of devices over a time range.

[delete]

#### Quad Usage by Number of Calls [LB]

Created: 04/14/1999

Total number of inbound and outbound calls for a list of devices over a time range.

[delete]

2300

Fig. 23

48/49

The image shows a graphical user interface window titled "My Custom Reports". In the top right corner of the window are three small square buttons. Below the title bar, the text "My Custom Reports" is on the left and "Save" is on the right, separated by a horizontal line. Below this line, the text "To save a custom report, please enter a title and description below:" is displayed. There are two input fields: "Report Title:" with the text "PA Sales/AD - Last Month Call Duration" and "Description:" with the text "Tabulates cumulative minutes of use for LAN and WAN calls originated and/or received by specified users during a time period." The description field has a vertical scrollbar on its right side. At the bottom left of the window is a button labeled "Save Report".

**My Custom Reports** Save

To save a custom report, please enter a title and description below:

**Report Title:** PA Sales/AD - Last Month Call Duration

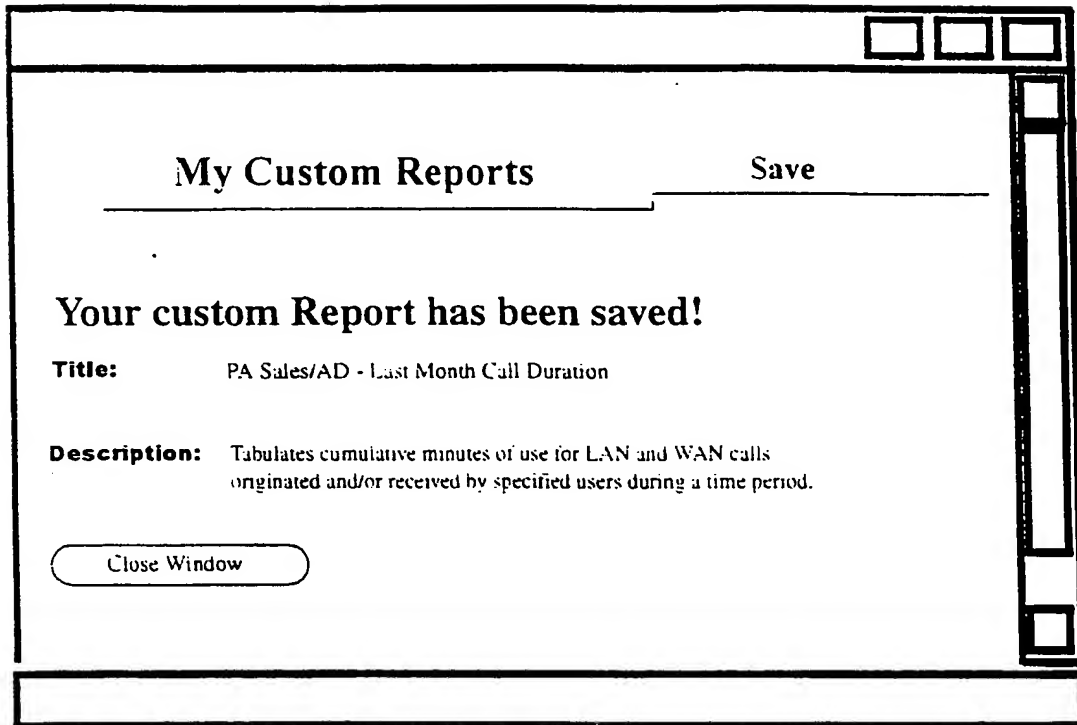
**Description:** Tabulates cumulative minutes of use for LAN and WAN calls  
originated and/or received by specified users during a time period.

Save Report

2400

Fig. 24

49/49



2500

Fig. 25



## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US00/15990**A. CLASSIFICATION OF SUBJECT MATTER**

IPC(7) :G06F 17/30

US CL :Please See Extra Sheet.

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

U.S. : Please See Extra Sheet.

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched  
IEEEElectronic data base consulted during the international search (name of data base and, where practicable, search terms used)  
Please See Extra Sheet.**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
	Please See Continuation of Second Sheet.	

☒ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:	*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
*A* document defining the general state of the art which is not considered to be of particular relevance	*X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
*E* earlier document published on or after the international filing date	*Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
*L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	*G* document member of the same patent family
*O* document referring to an oral disclosure, use, exhibition or other means	
*P* document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

11 AUGUST 2000

Date of mailing of the international search report

28 AUG 2000

Name and mailing address of the ISA/US  
Commissioner of Patents and Trademarks  
Box PCT  
Washington, D.C. 20231

Facsimile No. (703) 305-3230

Authorized officer

John E. Breene

Telephone No. (703) 305-9790

## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US00/15990

## C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5,862,325 A [REED et al] 19 January 1999, Figure 1, 7-8, col 3, lines 62-67, col 4, line 1-67, col 7, lines 58-67, col 8, lines 1-2, lines 34-67, col 9, lines 50-67, col 10, lines 1-10, col 11, lines 65-67, col 12, lines 1-47, col 14, lines 15-55, col 16, lines 55-67, col 17, lines 1-21, col 20, lines 13-49, col 22, lines 46-56, col 24, lines 45-67, col 25, lines 1-52, col 26, lines 36-46, col 34, line 49-67, col 35, lines 40-65, col 37, lines 44-53, col 41, lines 34-67, col 42, lines 1-15, col 43, lines 26-59, col 39, lines 30-39, col 52, lines 8-11, col 53, lines 66-67, col 54, lines 1-3, col 56, lines 43-67, col 57, lines 1-38, col 61, lines 61-67, col 62, lines 1-23, col 69, lines 27-67, col 70, lines 45-61, col 71, lines 59-67, col 72, lines 1-67, col 73, lines 1-11, col 77, lines 58-67, col 78, lines 1-4, lines 54-65, col 80, lines 18-26, col 92, lines 24-36, col 93, lines 30-43, col 96, lines 48-55, col 100, lines 58-67, col 101, lines 1-22, col 107, lines 44-67, col 109, lines 44-50.	1-52
A,P	US 5,987,454 A [HOBBS] 16 November 1999, Fig 1-1-4, 6A, 8, col 1, lines 35-67, col 2, lines 1-23, col 3, 1-67, col 4, lines 1-11, col 7, lines 34-67, col 8, lines 1-52, col 10, lines 44-67, col 11, lines 1-19, col 16, lines 34-59, col 18, lines 49-67, col 19, lines 54-67, col 20, lines 1-8, col 21, lines 5-39, lines 60-67, col 22, lines 1-30, col 23, lines 2-13	31, 42-43, 44, 52
A	US 5,893,903 A [EISDORFER et al] 13 April 1999, figs 1-3, col 1, lines 1-36, col 2, lines 55-67, col 3, lines 1-6, col 3, lines 34-67, col 4, lines 1-3, lines 45-53, col 4, lines 8-55, col 8, lines 9-15, col 8, lines 60-67, col 9, lines 1-35.	10-13, 22-23, 31-35

## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US00/15990

### A. CLASSIFICATION OF SUBJECT MATTER:

US CL :

345/968-969  
379/88.13,88.17,88.19,93.25,900-901,903,908  
705/17-18,20-22,43-44,51,56,58,72-73  
707/1-10,100-104,200-206,500-501  
709/201,203,213,217-220,223-224,230-232,236,249  
713/200-202

### B. FIELDS SEARCHED

Minimum documentation searched

Classification System: U.S.

345/968-969  
379/88.13,88.17,88.19,93.25,900-901,903,908  
705/17-18,20-22,43-44,51,56,58,72-73  
707/1-10,100-104,200-206,500-501  
709/201,203,213,217-220,223-224,230-232,236,249  
713/200-202

### B. FIELDS SEARCHED

Electronic data bases consulted (Name of data base and where practicable terms used):

Google, WEST 2.0

Search terms: multimedia, collaboration, reporting system, internet or www or world wide web or networks, events or activities, monitoring, modules, database or databases classifying or classification, attributes, query or search, parameters, SQL interface, generating reports or analysis or charts or graphs, centralize or decentralize, log files or log records or log session, user ids or customer ids or identification or password, timestamp, customizing reports, sharing data, workstations, filter, html or web page or web documents.